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PART I.

THE 1921 WHEAT SEASON.

By H. C. QUODLING, Director of Agriculture.

Another year has passed and another excellent crop of wheat has been garnered, now making two crops in succession which have proved to be bigger and better than any previously grown in the State. It is to be recognised that all primary products are subjected to a great deal of variation in price and, as a corollary, the producers are at times left with a very small margin of profit. However, the fact remains that wheat has done and is doing much to maintain Australia's financial position. In Queensland a distinct advance has been made. The 1920 crop proved to be a record one. Approximately 4,000,000 bushels of grain were



PLATE 2.—MIXED FARMING, KILLARNEY LINE, DARLING DOWNS.

harvested—more than sufficient to meet our own requirements—and an appreciable amount of wheat was exported. The crop was worth over a million sterling, and the average yield, 20.91 bushels per acre, was the highest in the Commonwealth.

The 1921 crop should approximate in quantity and average yield per acre that of the previous season. Although prices are not likely to be high, the quality of the grain is admittedly superior to that of 1920, being hard, bright, translucent, and of good keeping and shipping quality.

Queensland's position in respect to wheatgrowing is not circumscribed, as it is in many southern districts; here the grower has the choice of quite a variety of crops, and dairying, pig- and sheep-raising are commonly practised on wheat farms. In a sense, the soil is so productive that one is apt to overlook the fact that immense tracts of land still await development. The present is a fitting period for every patriotic Queenslander to take up a new slogan—"Wheat!" In this respect the words of "Banjo" Paterson, in his "Song of the Wheat," supply an inspiration—

"Green and amber and gold it grows
When the sun sinks late in the West;
And the breeze sweeps o'er the rippling rows
Where the quail and skylark nest.
Mountain or river or shining star,
There's never a sight can beat—
Away to the skyline stretching far—
A sea of the ripening wheat."



PLATE 3.—"A SEA OF THE RIPENING WHEAT."

Those who recently had the privilege of seeing our magnificent fields of wheat have spoken in no unmeasured terms of appreciation of all that they stand for. Others, not so favourably situated, may be able to form some idea at least of everyday scenes during harvest time from the series of illustrations presented with this article.

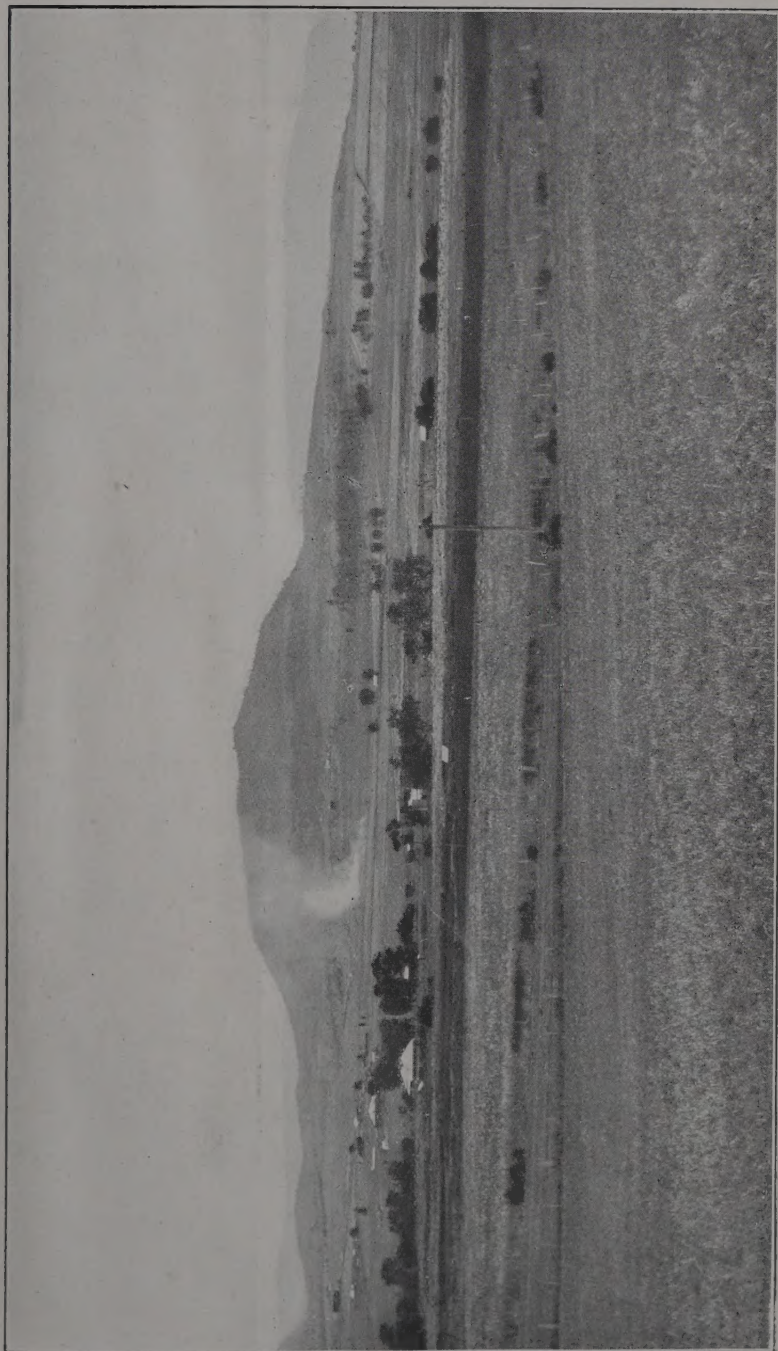


PLATE 4.—TYPICAL WHEAT COUNTRY, DARLING DOWNS.



PLATE 5.—HARVESTING "FLORENCE" WHEAT, ALLORA.

Last year was the first occasion wheat was marketed on co-operative lines under the 1920-21 Wheat Pool Bill, a measure which enabled growers to receive the fullest possible value for their grain, and it is a significant fact that a majority of these growers voted for a continuation of the Pool, which is now being carried on under the same chairman and manager; but three out of five members of the elected "Board" are recent nominees.



PLATE 6.—FIELD WORK, AFTER MORNING TEA, ALLORA.



PLATE 7.—TRACTOR-DRAWN REAPER-THRESHER TAKING OFF A 10-BAG CROP OF "PLASTRE" WHEAT, MR. C. DAVENEY'S FARM, MOUNT STURT.

A review of the season indicates that it was generally favourable for production, and although storms and hail beat down the ripening wheat in some localities, the losses were much less than those occasioned by these causes to the preceding crop. Damage was done in a few places by a visitation of caterpillars and grasshoppers (locusts), but these pests appeared late in the season, and this circumstance somewhat curtailed the period of their depredations. A heat wave also reduced the natural succulence of the plants, and, although causing premature ripening of crops, it had an effect of depriving the insects of soft, palatable food.

"Flag" rust was in evidence in most crops; subsequent damage, however, by the more harmful form of rust which attacks the stem of the plants was restricted to varieties susceptible to attack, and to crops which were either too succulent or had lodged on rich patches of soil.

The rains necessary for germinating seed were delayed until the second week of June. Harvest prospects, however, proved so encouraging that numerous orders for modern harvesting machinery were placed by growers who are keeping abreast of the times in the matter of labour-saving appliances, it being generally recognised that success can only be attained by keeping down the cost of production.

Wheat ripens earlier in Queensland than in any of the Southern States. In the neighbourhood of Mitchell and Roma it is often in the bag by the second week in October; this season the harvest proved a little later than usual and commenced about the last week of that month. Quick-maturing wheats were being harvested throughout the Darling Downs at the latter end of the first week of November. These, and the main crops were removed under fairly satisfactory harvesting conditions, but wind storms and hail affected some late-harvested areas.



PLATE 8.—A BUSY SCENE, CLIFTON RAILWAY STATION.

Taking all things into consideration, the reduction in the aggregate amount of wheat harvested, due to various disabilities, amounted to only a small percentage.

Busy scenes are to be witnessed at all centres where deliveries of grain are being made, and although the "stripper" of "Banjo's" day has given place to the more economical and modern system of harvesting by means of the present day "reaper-thresher," his words, in the following lines, carry a world of meaning:—

"When the burning harvest sun sinks low,
And shadows stretch on the plain,
The roaring strippers come and go
Like ships on a sea of grain,
Till the lurching, groaning waggons bear
Their tale of the load complete.
Of the world's great work he has done his share
Who has garnered a crop of wheat."

A retrospective view of the history of wheatgrowing in Queensland indicates great variation in yield and in the aggregate area annually put under crop.

For a number of years the average yield, over a ten years period, was slightly in excess of other wheatgrowing States in the South, and the distinction of attaining the highest average yield per acre for any one year, with 20.91 bushels per acre, belongs to Queensland; however, the mean for the last decade now places this State third on the list, a position brought about by three abnormally dry years—1911, 1915, and 1918.

The mean for ten years is shown hereunder—

	Per acre.
Victoria	11.91 bushels.
New South Wales	10.67 bushels.
Queensland	10.40 bushels.
South Australia	10.35 bushels.
Western Australia	8.91 bushels.

It is generally recognised that the soils on the major portion of the area cropped with wheat—the Darling Downs—are deeper than they require to be, and are also, if anything, too rich for the crop; moreover, that better and more consistent results would be attained if systematic effort were made in all farming operations to trap and conserve moisture, particularly the summer rains, which, after percolating to the subsoil, can be largely stored there for the benefit of subsequent crops. Proof of what is possible in a dry year may be instanced from a crop of "Warren" wheat which yielded a few seasons ago 24 bushels to the acre at the Roma State Farm, on an effective rainfall of only 1.76 in. during the growing period of the crop. Prior to planting the seed, good summer rains fell. Success is to be attributed to the fact that the whole of the cultivation was directed towards putting the ground into condition to receive a maximum amount of moisture, and holding it there by the maintenance of a well-worked soil mulch.



PLATE 9.—FALLOWING LAND AT ROMA WHEAT-BREEDING FARM, MARANOA DISTRICT.

If the possible failure of crops were to be overcome by evolving a wheat to withstand dry conditions, the matter of obtaining suitable varieties would be a matter of rigid selection of hardy types with a deep-rooting system and certain other essential botanical characteristics. Here, however, climatic conditions are variable, and at times conducive to rust, particularly in good seasons, when over-succulent crops are the rule, which latter form an ideal host for the propagation of rust spores; consequently, it was only to be expected that, whilst rust-labile wheats remained in cultivation, heavy losses were inevitable. Twenty-five years ago the Department of Agriculture and Stock, seized with the importance of bringing more suitable varieties into general cultivation which would combine rust-resistance and desirable field characteristics with grain of good milling and nutritive qualities, decided on a policy calculated to bring about the desired result.

Wheats were introduced from countries in different parts of the world and tested on farms, principally on the Darling Downs. It is of interest in this connection to recall the fact that "Marquis," a strong flour, red Fife type of wheat, was imported by the Department more than a decade ago, and is now favoured in a number of localities for mid-season sowing. The scheme of importing special kinds of grain and testing them had its limitations, and, in consequence, a more systematic effort was made to co-ordinate the work, to collect data concerning the behaviour of introduced wheats, and to admit of their classification and correct nomenclature and the control and distribution of varieties that had proved suitable. Two State farms were established—one at Westbrook, near Toowoomba, and another at Hermitage, near Warwick. Wheat improvement and experiment work were initiated at these institutions. Certain tests were also carried out in co-operation with Southern

Agricultural Departments. Later on, all the wheat selection work was transferred to Hermitage. It was soon found necessary to extend the scope of operations, and to test special wheat selections made at the farm on different soils, under variable climatic conditions. This field plot work, in conjunction with Departmental laboratory and milling tests, afforded more scope and was the means of introducing a number of valuable varieties into cultivation. Notable wheats from this source now found more or less in the principal wheatgrowing districts are "Amby," "Bunge," "Piastre," "Coronation," "Hiawatha," and "Hermitage Nos. 1 and 2."



PLATE 10.—A FIELD OF "HERMITAGE NO. 1" WHEAT, ALLORA.
YIELD, 11 BAGS PER ACRE.

The necessity arose for the establishment of another permanent establishment at Roma, where wheatbreeding and cultural tests could be carried on under drier conditions common to localities considered to be well suited for wheat production.

For the last twelve years careful and systematic work has been effected. A similar system to that previously referred to, of establishing field test plots, was continued, with the result that some excellent varieties have been added to wheats now in cultivation. Some of the newer varieties include "Soutter's Early," "Inglewood," "Patriot," "Cedric," and "The Prince."

Many of these new varieties from Hermitage and Roma State Farm have found favour with wheatgrowers; good yields, ranging from 7 to 12 bags (3 bushels each) of wheat were harvested from fairly large fields. Facts of this character show an accomplishment of purpose which is exercising a healthy influence in the choice of wheats suited to Queensland conditions. Work of this latter description is being vigorously carried on, and quite a number of new "crossbreds" evidence a capacity to mature quickly and escape rust, whilst others are equally promising in respect to rust-resistance.

Apart from Departmental varieties of wheat, several other kinds are commonly met with and find favour amongst growers, according to varying conditions of soil and climate and their relative sowing periods

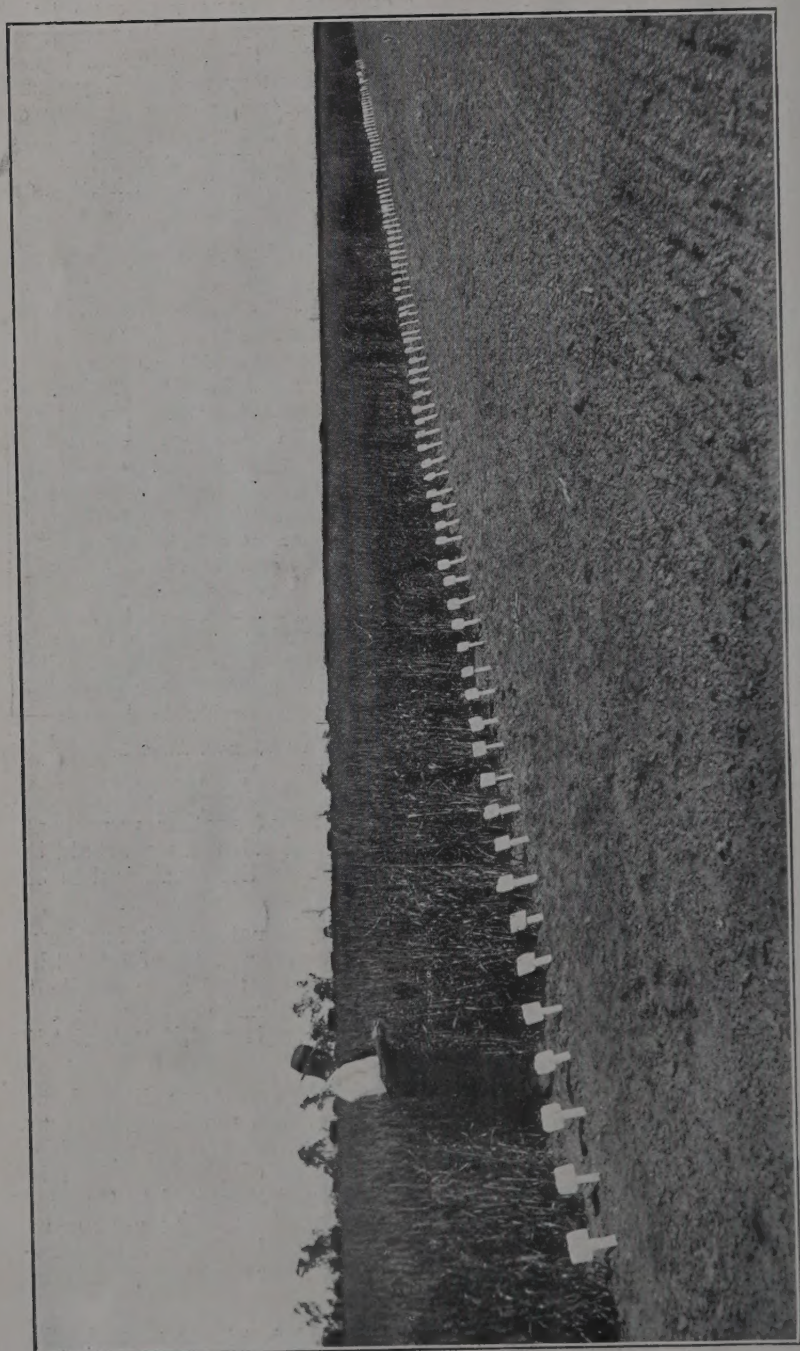


PLATE 11.—ROMA WHEAT-BREEDING FARM, MARANOA DISTRICT.



PLATE 12.—THRESHING FROM THE STOOK, NOBBY, DARLING DOWNS.

during the season. Chief of these are "Florence," "Comeback," "Marquis," "Cedar," "Cleveland," "Warren," "Gluyas," and "Currawa." Such a thing as a perfect variety of wheat to meet all conditions is practically unattainable. However, mention should be made of the adaptability to Queensland conditions shown by "Florence," a New South Wales variety. It is bunt- and rust-resistant, possesses a firm, fairly strong straw, and is a quick maturer. These excellent qualities outweigh other disabilities in the way of susceptibility to frost and a tendency of the grain to "shatter."

Excellent characteristics may also be claimed for many of the newer wheats introduced by the Department of Agriculture in Queensland.* Obviously, growers will advance their own interests by testing some, at least, of these, by sowing them at seasonable periods to determine whether such, or any variety, is superior to the varieties commonly grown.

Favourable seasons naturally account for a great deal in the production of all crops, but success in the main is only to be won by the indomitable will of the wheatgrower, whose outlook on life Mr. C. J. Dennis crystallises in his "Backblock Ballads":—

"When the settin' sun is gettin' low above the western hills,
When the creepin' shadows deepen, and a peace the whole world fills,
Then I often sort o' soften with a feelin' like content,
An' I feel like thankin' Heaven for a day in labour spent,
For my father was a farmer, an' he used to sit an' smile,
Realizin' he was wealthy in what makes a life worth while.
Smilin', he has told me often, 'After all the toil an' heat,
Lad, he's paid in more than silver who has grown one field of wheat.'

"Wheat, Wheat, Wheat! When it comes my turn to meet
Death the Reaper, an' the Keeper of the Judgment Book I greet,
Then I'll face 'em sort o' calmer with the solace of the farmer
That he's fed a million brothers with his Wheat, Wheat, Wheat."



PLATE 14.

" . . . with a feelin' like content,
An' I feel like thankin' Heaven for a day in labour spent."

* Approximately a million bushels of wheat were harvested in 1920 from varieties raised and brought into cultivation by the Department of Agriculture and Stock.—Ed.

SOME NOTES ON THE SOILS AND FOREST FLORA OF THE DIVIDING RANGE—NORTH OF ROMA.

By H. I. JENSEN, D.Sc. (Syd.).

(Continued from December "Journal.")

WESTGROVE—GLENHAUGHTON COUNTRY.

Between Injune Creek and the Carnarvon Range lies an expanse of country, most of which has been or is part of Westgrove Station. Between the Expedition Range and Taroom lies an expanse divided up into several cattle stations, principal of which is Glenhaughton.

These two areas, which we name after the principal stations on them, are very similar in nature, consisting of "Bundamba" sandstones in the northern parts, passing into Lower "Walloon" rocks of a highly calcareous nature in the southern and south-eastern parts.

The country met with in these two areas has a somewhat better rainfall, and possesses more coastal climatic conditions than the areas already described. As a result of this we get the soils more leached than the equivalent soils in other areas mentioned above, and the timber is a curious mixture of coastal and inland species.

The "Bundamba sandstone" soils are naturally a shade better on Westgrove than on Glenhaughton, owing to climatic differences and leaching conditions, but both are poor areas, not at all well suited for subdivision into small grazing selections. It is country like that of the Brown basin and Upper Nogoia one would like to see subdivided.

The "Bundamba" soils (sandstone) on Glenhaughton are so leached and poor that they are quite similar to our Bundamba sandstone areas in coastal parts, near Brisbane. They are so poor and sandy that the prickly-pear seldom transgresses on to the area, and will not spread across it; it is as effective a barrier to pear as the sandy sandstone soils of the Burpengary district are to the prickly-pear patches on the coast. This great sandstone area reminds one greatly of the Blue Mountains district of New South Wales in scenery, soil, climate, and vegetation. In the flowering season it contains a marvellous display of flowers like the sandy plateaux of the Blue Mountains. The forest trees include a profusion of acacias, amongst the following are very abundant:—*A. Cunninghamii*, *A. Bancroftii*, *A. juncifolia*, *A. flavescens*, *A. polybotrya*, and *A. acrifolia*. Amongst the eucalyptus species we have ironbarks (*E. decorticans*, *E. melanophloia*, narrow-leaved var., *E. crebra*, not common, spotted gum (*E. maculata*), also var. *citriodora* (lemon scented), crooked or tumble-down gum (*E. dealbata*), Moreton Bay ash (*E. tessellaris*), stringybark (*E. aemunioides?*), bloodwood (*E. terminalis*), yellowwood (*E. Watsoniana*), and yellow bloodwood (*E. trachyphloia*). Pine (*Callitris glauca*) occurs in belts. Dogwood (*Jacksonia*), stunted trunkless zamia, quinine (*petalostigma*—a tree variety, quadriloculare; and a low shrubby variety), boronia, &c., are also conspicuous. Hoveas, hardenbergias, grevilleas, hakeas, ricinocarpus, pultenea, and other genera were identified by Mr. White. Oak (*camarina torulosa* and *C. inophloia*), budgeroo (*Lysicarpus*), are also common. Finally, *Tristania suaveolens*, a coastal timber (swamp mahogany) is fairly abundant.

The "Walloon" shales and sandstone area of the Taroom district has excellent calcareous soils, similar to those already described for Injune Creek and Durham Downs, north of Roma. These soils are heavy black, brown, and chocolate soils, with brigalow-belar scrubs, patches of open plain; myall (*Acacia pendula*), wilga (*Geijera parviflora*, sandalwood (*Eremophila Mitchellii*) are also common in association with brigalow (*A. harpophylla*) and belar (*Casuarina lepidophloia*), or in belts by themselves, and baubinia, together with *Cadellia pentastylis* (ooline or Taroom solidwood) are abundant in the same thickets. These trees are uncommon in the Injune Creek brigalow scrubs. In some of the Taroom scrubs we also see a considerable admixture of the plants belonging to the coastal scrubs. This is particularly the case in the range between Broadmere and Glenhaughton, where the scrubs are partly on soils derived from volcanic trachyte flows capping the summits. Throughout this rich-soiled area the prickly-pear is spreading with most alarming rapidity. The country, but for this fact, would be most attractive dairying and agricultural land.

Another belt of geological formations occurring north of the "Bundamba" sandstone belt in these areas is the belt of "Ipswich" formations, which is divisible into—

- (a) The shales, limestones, and calcareous sandstones with typical calciphile flora and rich heavy soils in which prickly-pear is rampant, and where on the forest areas we get Moreton Bay box (*Tristania conferta*), molly box (*Eucalyptus cambageana*), and poplar box (*E. populifolia*); and

- (b) The sandstones of the same series, which are of a micaceous-felspathic nature, with good and light loamy soils suited for agriculture, where the country is not too rough and timbered with spotted gum (*E. maculata*), silverleaf ironbark (*E. melanophloia*), and tree zamia (*Macrozamia Moorei*).

These belts are found in the area at the head of the Robertson, Roper Pass, Ruined Castle Creek, and Bedourie.

THE DRUMMOND RANGE.

The rocks of the star formations at Bogantungan and on the tributaries of the Nogoa and Belyando, in the Drummond Range district, are divisible into an upper calcareous shale series and a lower sandstone series. The former series yields good pastoral country, timbered chiefly with silverleaf and narrowleaf ironbark; the latter is poor sandy country with the usual calciphile flora ironbark (*E. siderophloia* and *E. crebra*), sugar gum (*Angophora lanceolata*), Moreton Bay ash (*E. tessellaris*), yellow bloodwood (*E. trachyphloia*), quinine (*petalostigma*), &c.

On the flats where the soils mix we get the yellow-jacket (*E. Watsoniana*), bloodwood (*E. terminalis*), and the cabbage gum (*E. papuana*). There is no particularly good country in the Drummond Range as far as I have been, since the calcareous strata through the roughness of the country yield only shallow soils. The soils are exceedingly dry. The same belt where it occurs on more level country should yield fair soils.

Much more could be said, but all I desire is to emphasise the fact and add some more data in proof of the contention that this subject is important both to agriculture and forestry.

TABULATION OF FLORA COLLECTED BY JENSEN AND DUNLOP; DETERMINED BY MR. WHITE, GOVERNMENT BOTANIST; GEOLOGICALLY CLASSIFIED.

CALCAREOUS WALLOON COUNTRY AND CALCAREOUS SOILS, IPSWICH-BUNDAMBA JUNCTION.

Calciphile Vegetation.

Botanical Name.	Vernacular.	Locality.	Remarks.
<i>Eucalyptus melanophloia</i> ..	Silverleaf ironbark ..	Widespread ..	On stony ground
<i>E. populifolia</i> ..	Broadleaf box ..	Widespread ..	On heavy soil
<i>E. tessellaris</i> ..	Moreton Bay ash ..	Uncommon ..	Chiefly on sandy areas
<i>E. dealbata</i> ..	Tumbledown gum ..	Cornwall, &c. ..	On sandy soils
<i>E. rostrata</i> ..	River gum ..	Common ..	Along watercourses
<i>Acacia Cunninghamiana</i> ..	Wattle ..	Injune Creek and wide-spread ..	On loamy soils
<i>A. Bancroftii</i> ..	Wattle ..	Jack's Mountain (rare) ..	In brigalow-belar scrub
<i>A. homalophylla</i> ..	Narran ..	Jack's Mountain and Orallo ..	In brigalow-belar scrub
<i>A. harpophylla</i> ..	Brizalow ..	Very widespread ..	Common on lime-rich soil
<i>A. decora</i> ..	Wattle ..	Kilmory, Injune Creek, &c. ..	Common on lime-rich flats
<i>A. pendula</i> ..	Myall ..	Myall Downs, Mount Hutton ..	Common on lime-rich flats
<i>A. dealbata</i> ..	Wattle ..	.. ..	..
<i>Casuarina lepidophloia</i> ..	Belar ..	Very widespread ..	On sandy calcareous loams
<i>Angophora intermedia</i> ..	Apple ..	Widespread ..	Along creeks
<i>Alphitonia excelsa</i> ..	Red ash, Whiteleaf ..	Jack's Mountain ..	Common in brigalow-belar scrubs
<i>Atalaya hemiglauc</i> ..	Whitewood ..	Jack's Mountain ..	Common in brigalow-belar scrubs
<i>Canthium oleifolium</i> ..	Orange ..	Jack's Mountain ..	Common in brigalow-belar scrubs
<i>Canthium buxifolium</i> ..	Orange ..	Jack's Mountain ..	Common in brigalow-belar scrubs
<i>Capparis Mitchellii</i> ..	Orange ..	Jack's Mountain, Boxvale, &c. ..	Common in brigalow-belar scrubs
<i>Capparis lasiantha</i> ..	Orange ..	Jack's Mountain (creeper) ..	Common in brigalow-belar scrubs
<i>Cassia australis</i> ..	.. ..	Injune Creek ..	Common in brigalow-belar scrubs
<i>Carissa ovata</i> ..	Prickly turkey bush ..	Injune Creek, &c. ..	Common in brigalow-belar scrubs
<i>Cassinia laevis</i> ..	Rosemary ..	Jack's Mountain and Mount Hutton ..	Common in brigalow-belar scrubs
<i>Cassinia quinquefolia</i> ..	Rosemary ..	Injune Creek ..	Common in brigalow-belar scrubs
<i>Cassia eremophila</i> ..	Buttercup bush ..	Injune Creek ..	Common in brigalow-belar scrubs

Calciphile Vegetation—continued.

Botanical Name.	Vernacular.	Locality.	Remarks.
<i>Dodonea triangularis</i> ..	Hop bush	Dawson River ..	Common in sandalwood country
<i>Dodonea viscosa</i>	Hop bush	Widespread	Common in sandalwood country
<i>Owenia audula</i>	Emu apple .. ..	.. ..	Common in brigalow-belar scrubs
<i>Notelæa punctata</i> .. ..	.. ..	.. ..	Common in brigalow-belar scrubs
<i>Neterodendum olecefolium</i> ..	.. ..	.. ..	Common in brigalow-belar scrubs
<i>Olearia stellulata</i> .. ..	.. ..	.. ..	Common in brigalow-belar scrubs
<i>Eremophila Mitchellii</i> ..	Sandalwood	Widespread	More or less associated with belar and wilga
<i>Geijera parviflora</i>	Wilga	Widespread	With belar and sandalwood
<i>Aktonia constricta</i> ..	Peruvian bark ..	Kilmorey Range	Dividing ..
<i>Canthium oleifolium</i> ..	.. ..	.. ..	.. ..
<i>Notelæa microcarpa</i> ..	.. ..	.. ..	.. ..
<i>Hovea longifolia</i> .. ..	.. ..	Injune Creek .. ..	.. ..

VERY SANDY WALLCON COUNTRY. SILICIOUS BELTS AND BUNDAMBA SANDSTONES.

Calciphobe Plants.

<i>Eucalyptus dealbata</i> ..	Tumbledown gum ..	Cornwall and Orallo ..	.. ..
<i>E. tessellaris</i>	Moreton Bay ash ..	Cornwall and Orallo ..	.. ..
<i>Angophora intermedia</i> ..	Apple	Cornwall and Orallo ..	.. ..
<i>A. lanceolata</i>	Rusty gum	Cornwall and Orallo ..	.. ..
<i>Acacia macradenia</i> ..	Strangle wattle ..	Dividing Range and Dawson River	.. ..
<i>A. excelsa</i>	Ironwood	Durham Downs ..	Eurombah Creek and Frankvale Creek
<i>Hovea longipes</i> .. ..	.. ..	Widespread .. ..	.. ..
<i>Grevillea striata</i>	Beefwood	Widespread .. ..	.. ..
<i>Petalostigma quadrioculare</i> ..	Quinine	Widespread .. ..	.. ..
<i>Callitris glauca</i>	Cypress pine	Widespread .. ..	.. ..
<i>Exocarpus cypressiformis</i> ..	Cherry	Widespread .. ..	.. ..
<i>Jacksonia scoparia</i> ..	Dogwood	Widespread .. ..	.. ..
<i>Eucalyptus Siderophloia</i> var. <i>decorticans</i> ..	Ironbark	Kilmorey	Confined to high rough sandstones
<i>E. crebra</i>	Narrow-leaf ironbark ..	Dawson River to Jack's Mountain	.. ..
<i>Citrobatus pauciflorus</i> ..	Orange	Sandstone Hills ..	At Dawson River
<i>Prostanthera ringens</i> ..	.. ..	Kilmorey	Rough sandstone
<i>Bessia rhombifolia</i> .. ..	.. ..	Dawson River, &c. ..	Rough sandstone
<i>Leucopogon biflorus</i> ..	.. ..	Dawson River, &c. ..	Rough sandstone
<i>Acacia doraloxylon</i> ..	Lancewood	Dawson River, &c. ..	Rough sandstone
<i>A. Burrowi</i>	Wattle	Dawson River, &c. ..	Rough sandstone
<i>A. buxifolia</i>	Wattle	Wallaroo Creek ..	Rough sandstone
<i>Hovea longipes</i> .. ..	.. ..	Kilmorey	Rough sandstone
<i>Acacia decora</i>	Wattle	Kilmorey	Rough sandstone
<i>A. decurrens</i> , var. <i>dealbata</i> and var. <i>mollens</i> ..	.. ..	Kilmorey	Detrital sands
<i>A. podalyriæfolia</i>	Silver wattle	Kilmorey	Detrital sands
<i>Myoporum</i> sp. .. ..	.. ..	Westgrove	Sandstone
<i>Casuarina inophloia</i> ..	Stringybark oak ..	Dawson River ..	Rough sandstone
<i>Lysicarpus termitifolius</i> ..	Stringybark mermate or Budgera ..	Dawson River ..	Rough sandstone
<i>Xylomelum pyriforme</i> ..	Pear	Dawson River ..	Rough sandstone
<i>Invigofera australis</i> ..	Poison bush	Dawson River ..	Rough sandstone
<i>Thryptomene</i> sp. .. ..	.. ..	.. ..	.. ..
<i>Cassinia levis</i>	Rosemary	Dawson River ..	Rough sandstone
<i>Dodonea triangularis</i> ..	Hop bush	Dawson River ..	Rough sandstone
<i>Cassia Eremophila</i> ..	Buttercup bush ..	Dawson River ..	Rough sandstone
<i>Acacia Cunninghamii</i> ..	Wattle	Baffle Creek	Rough sandstone

IN WET PLACE ON POOR SANDSTONE COUNTRY (MOSTLY ARENOPHILE).

<i>Angophora intermedia</i> ..	Apple	Dawson River and Baffle Creek	.. ..
<i>A. lanceolata</i>	Sugar gum	Dawson River and Baffle Creek	.. ..
<i>Callistemon viminalis</i> ..	Red bottle brush ..	Dawson River and Baffle Creek	.. ..
<i>Leptospermum flavesceus</i> ..	Tea tree	Dawson River and Baffle Creek	.. ..
<i>Melaleuca leneodendron</i> ..	Paper-barked or broad-leaved tea tree ..	Dawson River and Baffle Creek	.. ..
<i>Acacia Macradenia</i> ..	Strangle wattle ..	Dawson River and Baffle Creek	.. ..

NEAR JUNCTION OF IPSWICH AND BUNDAMBA SERIES, CARNARVON RANGE.

Botanical Name.	Vernacular.	Locality.	Remarks.
<i>Eucalyptus maculata</i> ..	Spotted Gum	Carnarvon Range ..	Sandy soil
<i>E. acmenioloides</i>	Stringybark	Carnarvon Range ..	Sandy soil
<i>Macrozamia</i> sp.	Burrawang .. ..	.. ..	.. ..
<i>E. hemphillia</i>	Gumtop box	Carnarvon Range ..	Sandy soil

PLANTS COLLECTED BY H. I. JENSEN NORTH OF THE MAIN DIVIDING RANGE (GEOLOGICALLY CLASSIFIED).

Calciphile Plants.

Botanical Name.	Vernacular.	Locality.	Remarks.
<i>Cadillia pentastylis</i> ..	Ooline	Taroom district ..	On calcareous Walloon
<i>Acacia harpophylla</i> ..	Brigalow	Taroom, Bedourie, Brown and Nogoa Valleys	On calcareous Walloon, Ipswich, and both Upper and Lower Bowen limestones
<i>Alphistonia excelsa</i> ..	Red ash	Broadmere, Glenhaughton Range	Volcanic soils
<i>Owenia venosa</i>	Crow's apple	Broadmere, Glenhaughton Range	Volcanic soils
<i>Hoya australis</i>	Snake vine	Broadmere, Glenhaughton Range	Volcanic soils

Also bauhinia, belar, and most of the calciphile plants mentioned for the Ipswich-Bundamba south of the Main Range.

<i>Eucalyptus microtheca</i> ..	Coolibar	Nogoa and Brown River Tributaries	Mainly on alluvial soils
<i>E. hemiphloia</i>	Gumtop box	Nogoa and Brown River Tributaries	Mainly on basalt soils

REQUIRING GOOD, HEAVY LOAM.

<i>Eucalyptus melanophloia</i> ..	Silverleaf ironbark ..	Calcareous loams ..	Good drainage required
<i>E. tereticornis</i>	Red gum	Along River and Creek flats generally	All formations, but on alluviated ground
<i>E. Cambageana</i>	Molly box	Bedourie, Clematis Creek, Jack's Mountain, Walangara Creek, &c.	Ipswich formation calcareous sandstone
<i>E. popellifolia</i>	Poplar box	Bedourie, Clematis Creek, Jack's Mountain, Walangara Creek, &c.	Ipswich formation calcareous sandstone
<i>Acacia podalyriæfolia</i> ..	Silver wattle	Bedourie, Clematis Creek, Jack's Mountain, Walangara Creek, &c.	Ipswich formation calcareous sandstone
<i>Tristania suaveolens</i> ..	Swamp mahogany ..	Widespread; Springsure to Taroom	On moist heavy soils
<i>Tristania conferta</i>	Moreton Bay box ..	At intervals over same area	On dry but good loams

CALCIPHOBESPECIES—ALL ON SANDSTONE COUNTRY.

* <i>Acacia Bancroftii</i>	Wattle	Widespread	Silicious sandstones of Bundamba age
<i>A. nerifolia</i>	Wattle	Glenhaughton ..	Silicious sandstones of Bundamba age
* <i>A. Cunninghamii</i>	Wattle	Widespread	Silicious sandstones of Bundamba age
† <i>A. polybotrya</i> var. <i>foliolosa</i>	Wattle	Glenhaughton ..	Silicious sandstones of Bundamba age
† <i>A. flavescens</i>	Wattle	Glenhaughton ..	Silicious sandstones of Bundamba age
<i>A. complanata</i>	Wattle	Glenhaughton ..	Silicious sandstones of Bundamba age
† <i>A. argentea</i>	Wattle	Glenhaughton ..	Silicious sandstones of Bundamba age
† <i>A. juncifolia</i>	Wattle	Glenhaughton ..	Silicious sandstones of Bundamba age
† <i>A. brevifolia</i>	Wattle	Glenhaughton ..	Silicious sandstones of Bundamba age
† <i>A. conferta</i>	Wattle	Glenhaughton ..	Silicious sandstones of Bundamba age
<i>A. podalyriæfolia</i>	Wattle	Walangara Creek, Mount Hope	Mixed soils

* These species occur on Bundamba, Upper Bowen, Middle Bowen, and other silicious sandstones.
 † Coastal species. ‡ Inland species.

CALCIPHOBES SPECIES—ALL ON SANDSTONE COUNTRY—continued.

Botanical Name.	Vernacular.	Locality.	Remarks.
<i>A. salicina</i>	Black wattle	Clematis Creek ..	Sandstone, U. Bowen
<i>A. difficilis</i> .. ..	.. ..	Clematis Creek ..	Sandstone, U. Bowen
<i>A. excelsa</i>	Ironwood	Clematis Creek ..	Alluvial patches
<i>A. doratoxylon</i>	Lancewood	Clematis Creek ..	Dry hill slopes with shallow ferruginous soils
<i>Casuarina torulosa</i>	Oak	Glenhaughton ..	Sandy dry country
<i>C. inophloia</i>	Oak	Glenhaughton, Clematis Creek, Moolayamberg, Dawson River	Very sandy dry country
<i>Ricnocarpus Bowmanni</i> .. ..	.. ..	Glenhaughton ..	On dry sandy sandstone range country.
<i>Grevillea juncifolia</i> .. ..	.. ..	Glenhaughton ..	On dry sandy sandstone range country
<i>Pultenea ternata</i> .. ..	.. ..	Glenhaughton ..	On dry sandy sandstone range country
<i>Hovea longifolia</i> .. ..	.. ..	Glenhaughton ..	On dry sandy sandstone range country
<i>Boronia ledifolia</i> .. ..	.. ..	Glenhaughton ..	On dry sandy sandstone range country
<i>Hakea plurinervia</i>	Beefwood	Glenhaughton ..	On dry sandy sandstone range country
<i>Petalostigma quadriloculare</i>	Quinine	Glenhaughton ..	On dry sandy sandstone range country
<i>Cœlospermum reticulatum</i> .. ..	.. ..	Clematis Creek ..	Upper Bowen sandstone
<i>Heterodendron oleæfolium</i> .. ..	.. ..	Clematis Creek ..	.. ..
<i>Eucalyptus decorticans</i>	Ironbark	Clematis Creek, Glenhaughton, &c.	Dry sandstone mountains
<i>E. Muellieriana</i> .. ..	.. ..	.. ..	.. ..
<i>E. maculata</i> and <i>E. var. Atriodora</i>	Spotted gum	Meteor Creek and Clematis Creek	Ranges ..
<i>E. crebra</i>	Narrow leaf ironbark ..	Widespread ..	.. ..
<i>E. melanophloia</i> (narrow leaved variety)	Silverleaf ironbark ..	Widespread, but chiefly on better patches	.. ..
<i>E. dealbata</i>	Tumbledown gum ..	Glenhaughton, &c. ..	On poor sour country
<i>E. tessellata</i>	Moreton Bay ash ..	Widespread	On deep sandy loams
<i>E. acmenioides</i>	Stringybark	Widespread	On dry sandy ridges
<i>E. Watsoniana</i>	Yellowjacket	Widespread	On deep sandy soils
<i>E. terminalis</i>	Bloodwood	Widespread	On sandstone alluvials
<i>E. trachyphloia</i>	Yellow-wood	Widespread	On dry but deep sandy soils
<i>Angophora lanceolata</i>	Sugar gum	Widespread	On deep sandy soils
<i>A. intermedia</i>	Apple	Widespread	On alluvial loams
<i>E. rostrata</i>	River red gum	Nogoa region	On fair loams
<i>Lysicarpus tenuifolius</i>	Budgeroo tree	Widespread	On dry sandy ridges and tablelands
<i>Xylomelum pyriforme</i>	Wooden pear	Widespread	With "budgeroo"

Alluvials and deep detrital soils always have an abundance of apple (*Angophora intermedia*) and in the Nogoa and Brown River basins also cabbage gum (*Eucalyptus papuana*).

CONCLUSION.

The main utility of an investigation of this kind is, of course, in judging country by the timbers, and knowing what timbers to reafforest an area with from the nature of the soils. We will take a few instances to illustrate these points.

Take, first, the ironbarks. The narrowleaf (*E. crebra*) is so cosmopolitan in associations that it signifies little except dry, well-drained, and somewhat stony country. The silverleaf (*E. melanophloia*) must have calcareous and well-drained soil, good in plant food, and never waterlogged. It grows on the ridges with shallow but rich calcareous soil in the Stanthorpe district, in the Walloon belt north of Roma, and innumerable other places, but on Clematis Creek Gorge we find it along the watercourse in deep, alluvial loam. The lime attracts it here, and, though floods may sweep down the gorge, the run-off is so rapid that in a few days the soil is dry and sweet again. The mountain ironbark or gumtopped ironbark (*decorticans*) must have rocky, well-drained, and elevated sandy country to thrive. We only get it in the belts I have examined in such country. Here we get it associated with lancewood, budgeroo, &c., which have an affinity for similar country.

Take, now, lancewood (*Acacia doratoxylon*). This timber grows in similar situations to mountain ironbark, but chiefly where the sandstone is ferruginous. When the soil is pure silica sand we get with the ironbark (*decorticans*) budgeroo (*lysicarpus*) and stringybark (*E. acmenioides* with leaves like *Angophora intermedia*), and also the woolly oak (*Casuarina inophloia*).

In what has already been written, enough has been said to show what brigalow, belar, and poplar gum signify.

Sugargum (*Angophora lanceolata*) always seeks a deep, sandy loam—very poor in mineral plant food, but with high capillary power, but where such loams get richer in plant food we get Moreton Bay ash (*Eucalyptus tessellaris*) in similar looking soils. Both are associated with *Angophora intermedia* (apple), which is cosmopolitan to all loamy and sandy soils containing good water below, but in rich clay soils of alluvial origin it yields place to coolibar (*E. microtheca*). Tumbledown gum (*Eucalyptus dealbata*) grows in poor soils where the drainage is bad. Poplar box grows in rich soils where the drainage is inferior, but poplar box (*E. populifolia*) will also grow on higher country as long as it is a heavy and fairly good soil. With it the texture and chemical nature of the soil weighs more than drainage. The sandalwood (*Erremophila Mitchellii*) requires a soil good chemically, but impervious and inclined to be heavy and of great absorptive power for water, hence somewhat sour at intervals, but not necessarily alkaline, while brigalow seeks an alkaline soil.

Gumtup box (*E. hemiphloia*) usually means good soils inclined to be heavy loams and rich in plant food. It grows on basalt, limestone, and alluvial country, and requires good drainage; otherwise we get coolibar box instead.

These permutations and combinations can be considerably extended. It is a study which has both economic value and scientific interest to the natural historian. It is one in which geologists, botanists, forestry experts, surveyors, and agriculturists can collaborate and do good work.

SUDAN GRASS—A SORGHUM.

By F. F. COLEMAN, Expert under the Pure Seeds Acts.

About ninety years ago the then Sultan of Turkey was interested in the culture of cotton, and applied to the Governor of South Carolina for an instructor. Two or three years later the instructor returned to the United States of America and brought with him the seeds of a number of plants, among which was a kind of sorghum. An Alabama planter, Colonel Wm. Johnson, whilst on a visit to South Carolina, became interested in the new plant, and raised it extensively in the fertile lands of the Alabama River. Hence its name, Johnson Grass. Once established, it became almost impossible to kill it, because of its deep-running branching root stocks. But for the fact of its being a tropical plant, likely to be winter-killed where the ground freezes to any depth, it might have possessed the land to a greater extent.

When looking for an annual form of sorghum with the characteristics of Johnson, but without its persistent root stock, no better place for a search could be found than countries adjacent to the place from which Johnson was first obtained.

Recognising this fact, an organised search for forms lacking these root stocks was made by the United States of America Department of Agriculture, which in 1909 obtained from the Director of Agriculture at Khartoum a sorghum known to the natives as "Garawi." In order to give it distinctiveness, this was called "Sudan grass," by which name it is now popularly known.

Sudan grass has been described by Charles V. Piper, of the United States Department of Agriculture, as *Andropogon Sorghum*, var. *Sudanensis*, Johnson grass being known as *Andropogon halepensis*, and is distinguished from all other forms of cultivated sorghum by possessing underground root stocks, thus being truly perennial.

Recently a very thorough and scientific examination of tropical grasses was made at the Royal Botanic Gardens, Kew, London, and Mr. O. Stapf has revived the name of "sorghum" for this section of the *Andropogoneæ*.

Sudan grass should therefore be known as *Sorghum Sudanense* Stapf.

Farmers would do well to realise that Sudan grass is a sorghum; the use of the botanic name *Sorghum Sudanense* will keep it before them, and may save considerable loss if the care required for sorghum is always used with Sudan.

The origin of the cultivated sorghums is a problem as yet undecided. The wild forms, however, are easily separated into two groups—namely, the perennials, with root stocks like Johnson, and the annuals, with fibrous roots only, such as Sudan and Tunis grass and kindred growths. The latter cross spontaneously with the cultivated sorghums, while the former are difficult to cross.

It is thus seen that Sudan grass (*Sorghum Sudanense*) is easily cross-fertilised by any of the cultivated sorghums, and when grown near any other variety a number of variants or rogues will appear. These rogues do no harm if the crop is for feed, but, in case of a crop intended for seed, the rogues must be pulled out. This should be done as soon as they can be distinguished, which would prevent further crossing

but cannot make the grain quite pure. Care should, therefore, be taken to sow seed from a true strain, and to go over the crop, pulling out all variants. Further, the seed must be grown in an isolated place, away from any other kind of sorghum.

On pages 7 and 8 of the "Queensland Agricultural Journal" for July, 1921, will be found an article on the poisonous glucosides sometimes found in sorghums. The article makes a special reference to both Sudan and Saccaline, and should be of more than passing interest to all farmers.

The different types of cultivated sorghums may be divided into three groups, based on the economic use of the crop:—

- (a) Saccharine sorghums.
- (b) Non-saccharine sorghums.
- (c) Broom corns.

Saccharine sorghums are those with abundant sweet juice, cultivated at one time principally for syrup manufacture and now as a forage plant. This group is referred to in the United States of America as "sorgo." Non-saccharine sorghums contain a scant juice, slightly sweet to subacid, grown principally for grain, but also as a forage plant. Broom corns are non-saccharine, pith-dry, grown for the brush, and are not valuable as a forage plant.

The standard of purity and germination, prescribed by the Regulations under the Pure Seeds Act, for sorghums, is:—

Inert matter (chaff, dust, broken seed, and all matter other than seed)—
2 per cent. by weight.

Seeds of weeds or seeds of any kind other than to which the sample purports to belong—1 per cent. by weight.

Dead and non-germinable seeds—25 per cent. by count.

In other words, the pure seeds contained in the sample must give a germination of 75 per cent., and the sample must not contain more than 2 per cent. of inert matter and 1 per cent. of foreign seeds.

The weed and other foreign seeds of most frequent occurrence in *Sorghum Sudanense* are:—

Datura stramonium (Thorn apple). All parts of this plant are poisonous, especially the seeds.

Xanthium spinosum (Bathurst burr).

Hibiscus trionum (Bladder ketmia).

Chenopodium sp. (Goosefoot or fat hen).

Panicum sanguinale (Queensland summer grass).

Sorghum vulgare (Sorghum).

Avena fatua (Wild oat).

Centaurea melitensis (A star thistle).

Bromus unioloides (Prairie grass).

Melilotus parviflora (Hexham scent).

Sida retusa (Sida weed).

Polygonum sp., *Setaria* sp., *Apium* sp.

In the course of the last two years, a large number of *Sorghum Sudanense* samples have been examined at the seed laboratory, with the following results:—

Sixty samples in every 100 examined grew 75 per cent. or better.

Twenty samples in every 100 examined on account of impurities or low germination were classed as B grade.

Twenty samples in every 100 examined did not comply with the regulations under the Pure Seeds Acts, on account of impurities or low germination.

When it is considered that the standard for B grade sorghums is only 60 per cent. germination of pure seeds, and the amount of weed or other foreign seeds allowed 2 per cent., with 3 per cent. of inert matter, the figures give cause for grave reflection.

The best of seed-cleaning machinery cannot remove all impurities, and the seriousness of such pests as *Datura Stramonium* should be combated by those at the seat of the trouble—the farm where the seed was grown.

The recent loss of cows in the Goombungee district again directs attention to the fact that sorghums are sometimes poisonous; every grower should therefore remember that Sudan grass is a sorghum.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, NOVEMBER, 1921.

There was a decrease in egg production during the month. This can be accounted for by the extremely adverse weather conditions, the weather during the month being excessively hot, the temperature for days at a stretch being in the vicinity of 100 deg. in shade, and one day registering 106 deg. The result was that four deaths occurred, and several birds had to be removed to hospital for treatment. Broodies were extremely troublesome, the following being the only breeders competing in the heavy section who had only one broody:—Walters, Shanks, Singer, and Morris. Not a single heavy pen was free, and in some cases every bird in the pen was at one time out in the broody coops, some of them even twice. Those who lost birds during the month with the heat were:—Stacey, O. Goos, Oakleigh Poultry Farm, J. W. Newton, and W. Barron. The following are the individual records:—

Competitors.	Breed.	Nov.	Total.
LIGHT BREEDS.			
*J. M. Manson	White Leghorns ...	151	1,054
*W. and G. W. Hindes	Do.	144	1,044
R. Gill	Do.	125	1,028
*Mrs. R. Hodge	Do.	153	1,004
*G. Trapp	Do.	127	982
*H. Fraser	Do.	146	976
*T. Fanning	Do.	158	961
F. Birchall	Do.	118	955
*H. C. Towers	Do.	121	950
H. C. Thomas	Do.	116	948
*C. M. Pickering	Do.	134	947
Oakleigh Poultry Farm	Do.	123	935
*W. Becker	Do.	132	909
R. C. Cole	Do.	113	905
W. A. Wilson	Do.	115	900
*C. Goos	Do.	137	894
*J. W. Newton	Do.	121	884
*Thos. Eyre	Do.	139	881
*R. C. J. Turner	Do.	139	879
Mrs. E. White	Do.	126	876
W. Barron	Do.	118	859
*Thos. Taylor	Do.	131	865
M. F. Newberry	Do.	127	863
Bathurst Poultry Farm	Do.	113	862
*S. L. Grenier	Do.	133	859
*E. A. Smith	Do.	138	851
*E. Chester	Do.	118	847
H. Stacey	Do.	89	846
*G. Williams	Do.	130	842
*Mrs. L. Anderson	Do.	135	839
*B. Chester	Do.	116	838
J. W. Short	Do.	130	836
O. C. Goos	Do.	108	806
*Haden Poultry Farm	Do.	129	804
Mrs. E. Z. Cutcliffe	Do.	105	796
*H. P. Clarke	Do.	131	783
E. Stephenson	Do.	83	773
*W. and G. W. Hindes	Brown Leghorns ...	105	767
Linquenda Poultry Farm	White Leghorns ...	97	748
W. M. Glover	Do.	106	733
Brampton Poultry Farm	Do.	118	717

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	Nov.	Total.
HEAVY BREEDS.			
T. Fanning	Black Orpingtons ...	119	1,080
*R. Burns	Do.	124	1,018
*A. E. Walters	Do.	135	998
*T. Hindley	Do.	120	991
W. Becker	Langshans	127	988
Rev. A. McAllister	Black Orpingtons ...	93	975
*Jas. Ferguson	Chinese Langshans ...	98	973
*Parisian Poultry Farm	Black Orpingtons ...	111	956
*C. C. Dennis	Do.	123	943
Jas. Ryan	Rhode Island Reds ...	116	936
G. Muir	Black Orpingtons ...	105	933
*E. Morris	Do.	136	915
Jas. Potter	Do.	84	912
Jas. Every	Langshans	89	906
*E. F. Dennis	Black Orpingtons ...	105	894
*J. Cornwell	Do.	105	879
*N. A. Singer	Do.	124	848
*E. Stephenson	Do.	89	822
*R. Holmes	Do.	97	822
C. Cumming	Do.	119	810
*J. E. Smith	Do.	118	804
*A. Shanks	Do.	121	801
*Mrs. G. Kettle	Do.	96	784
*H. M. Chaille	Do.	95	779
J. W. Newton	Do.	94	772
*E. Oakes	Do.	113	750
F. Harrington	Rhode Island Reds ...	97	706
Tom C. Hart	Black Orpingtons ...	118	650
Total ... ..	...	8,172	60,691

* Indicates that the pen is being single tested.

DETAILS OF SINGLE TEST PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
J. M. Manson	163	178	191	166	195	161	1,054
W. and G. W. Hindes (W.L.) ..	185	161	173	188	182	155	1,044
Mrs. R. Hodge	165	172	185	171	178	133	1,004
Geo. Trapp	168	153	164	160	174	163	982
H. Fraser	189	140	171	161	165	150	976
T. Fanning	176	152	172	149	153	159	961
H. C. Towers	167	145	165	127	160	186	950
C. M. Pickering	176	160	154	140	179	138	947
W. Becker	176	171	139	141	170	112	909
Chris. Goos	154	172	123	116	133	196	894
J. W. Newton	149	166	174	152	103	140	884
Thos. Eyre	154	145	108	158	163	153	881
R. C. J. Turner	152	139	141	134	155	158	879
Thos. Taylor	144	151	140	121	132	177	865
S. L. Grenier	148	167	116	145	145	138	859
E. A. Smith	174	144	151	139	135	108	851
E. Chester	157	144	131	139	136	140	847
G. Williams	192	152	114	122	134	128	842
Mrs. L. Anderson	145	154	136	131	148	125	839
B. Chester	124	142	161	136	151	124	838
Haden Poultry Farm	92	127	147	147	139	152	804
H. P. Clarke	174	111	137	104	139	118	783
W. and G. W. Hindes (B.L.) ..	117	124	109	116	129	172	767

DETAILS OF SINGLE TEST PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
R. Burns	118	151	209	157	182	201	1,018
A. E. Walters	184	175	154	163	153	169	998
T. Hindley	174	173	176	134	164	170	991
J. Ferguson	158	144	145	186	164	176	973
Parisian Poultry Farm ..	164	154	158	206	116	158	956
C. C. Dennis	157	148	142	174	163	159	943
E. Morris	174	159	107	171	152	152	915
E. F. Dennis	136	163	143	147	141	164	894
J. Cornwell	141	136	147	164	138	153	879
N. A. Singer	147	130	139	142	121	169	848
E. Stephenson	160	132	139	143	107	141	822
R. Holmes	116	140	140	146	167	113	822
J. E. Smith	170	185	128	109	110	102	804
A. Shanks	108	131	131	145	134	152	801
Mrs. G. Kettle	132	153	170	85	112	132	784
H. C. Chaille	100	142	134	161	136	106	779
E. Oakes	108	135	129	157	108	113	750

CUTHBERT POTTS,
Principal.

JUDGE'S REPORT.

In reporting on the judging for "trueness to type," Mr. A. G. Harwood, College Poultry Instructor, writes:—

"It is pleasing to note that a big improvement in type and size of Leghorns has been made. It would appear as if the time had passed when the little squirrel-tailed bird held sway. There is hardly a specimen of this kind to be seen among the 246 competing Leghorns this year.

"On looking back over the past five years, in the course of which our 'true to type' conditions have been in force, and on comparing the type of birds in the current competition with that displayed in previous years, one feels highly gratified with the advance breeders have made, and this with no decrease in egg-production. When it was established that all birds entering for our competitions would be subjected to judgment for 'trueness to type,' we were often confronted with the remark that 'production was required, not feathers.' The steady improvement in type accomplished so far, coupled as it is with an equally high fecundity, would seem to take all sting out of this dictum.

"But there is another feature which is perhaps of even more importance than the retention of an exceedingly high fecundity. In our judgment for type, great stress is laid on stamina. Birds are subjected to egg-laying tests with the object of using them and others of the same breeding for stud purposes. With weak-constitutioned birds, incubation losses and hatching troubles are great. These can be minimised if stud birds are strong, healthy, and possess great stamina. Had our judgment for type accomplished nothing else but an improvement in this direction, it would have been justified, even had this improvement been accompanied by a slight diminution in egg-production.

"In regard to this, we would again remind breeders of the wisdom of carefully noting any sickness or trouble in each bird in the course of its rearing. However much the birds may appear to have recovered by the time they are selected for competition, it is almost certain that their previous ailments will tell against them in the strenuous effort of rapid egg-production. Again, it has to be remembered that the College competition is conducted under open weather conditions. Birds bred under confined, and frequently under super refined, conditions have no opportunity to display many weaknesses in constitution and stamina which they may possess. These weaknesses, however, show up under the more open conditions obtaining in the competition.

"The Orpington still gives difficulty in classification, and, as previously, we have had to be lenient in our judgment. What is the most typical pen has proved to contain excellent producers, the six birds laying 882 2-oz. eggs in seven months. These birds possess almost perfect heads according to the Orpington standard. They are blocky and low set (but not to the extreme of the show bird), fairly good tails, and a moderate back. Their colour was excellent on arrival, and their uniformity is most striking. They have a moderate tightness in the feather. The majority of the birds, however, while uniform among themselves, vary much from the Orpington standard. They form a type of their own. This has been pointed out at our last two poultry conferences. Undoubtedly we should adopt a special standard for our laying Orpingtons. As relevant to this point, we quote from a report of the Hague Congress:—

"Mr. Bogaert then spoke on the desirability of international standards being issued. He thought that the country of origin should issue the standard and other countries fall into line. He alluded to the Campine, which in English hands has become quite different to the Belgian fowl. He also spoke of the Leghorn, and pleaded for a universal type.

"Mr. C. S. Van Gink considered that Mr. Bogaert was too sweeping. Such drastic changes would only be effected gradually, and the matter should be discussed at the next congress. Mr. Van Gink remarked that some countries had apparently misunderstood the schedule of the exhibition, and thought that they could only send birds of their own country. This was not so, as they had hoped that any variety would be sent from any country.

"Mr. Edward Brown then spoke on the international standard, and said in his opinion it would be a blunder to insist on such a thing, as the characteristics of a breed were altered by many facts, such as feeding, climate, soil, &c. The countries of Western Europe have paid much attention to breeding, while other countries have not. He exemplified the Leghorn, originated in Italy, and the Minorca in Spain, both of which had been improved by breeders in other countries. Had an international standard been insisted upon, the exhibition would have suffered considerably, as English Houdans could not have been shown, being very different from the French, and the English Brahma differed widely from its oriental stock. He suggested that the subject should be discussed by a committee as of much importance. Mr. Voittelier agreed with Mr. Brown, and thought an international standard undesirable.

"An Italian speaker thought that every country should have a standard for each variety. Unfortunately in Italy they had none, not even for Leghorns, but they hoped it might be remedied shortly."

"Action has already been taken in this direction in England. Birds sent over from Australia were not recognised as Orpingtons. Instead, they were given the name of 'Australorps,' and a club has been formed to foster the breed. Is it not Australia's duty now to decide upon a standard, adopt the name given by the English breeders, and so save the confusion existing in respect to two distinct and different types? In the current competition at Gatton there are a large number of fine, big, strong blacks of a distinct type. That they have stamina and can produce eggs cannot be denied, but their length of back, length of shank, cut-away front, and long tail in no way compares with the requirements of the Orpington standard. They are absolutely a type of their own. Type makes the breed and colour the variety, and 'Black Australorps' should be their name henceforward."

Details of competing pens are subjoined:—

TRUENESS TO TYPE.

Name.	Class.	Remarks.
S. L. Grenier	1	Good size; typical; good doers.
W. and G. W. Hindes (W.L.)	2	On small side; never still in their pens.
Mrs. L. F. Anderson ..	1	Uniform and of good type.
Geo. Williams	3	"F" and "D" feathers on shank; variation in outline; splendid doers.
Mrs. R. Hodge	1	The best pen of Leghorns in the test; clean faces, plenty of size, and every bit Leghorns.
J. M. Manson	2	Not too uniform, but hard, tough workers.
W. Becker	1	Just managed this class, their stamina availing them.
Chris. Goos	2	Type variable; "D" and "E" amongst the best birds in the test.
J. W. Newton	2	Headpieces not too uniform; indifferent feeders at times.
T. Taylor	4	"D" very fair; the others too small.

Name.	Class.	Remarks.
Haden Poultry Farm	.. 2	Variable; poor feeders.
H. P. Clarke .. ..	.. 1	An excellent pen throughout.
Thos. Eyre .. ..	.. 1	Could be more uniform; show good stamina.
Harold Fraser .. ..	.. 2	"B" spoils an otherwise first-class pen; she is on the small side, and possesses an upright comb. "A" is very typical.
Geo. Trapp .. ..	.. 1	Very uniform; good length; deep behind.
T. Fanning .. ..	.. 1	Typical; hard, good doers.
R. C. J. Turner .. ..	.. 1	Could do with more width; good length, and uniform.
W. and W. G. Hindes	.. 1	Brown Leghorns as big as any Whites; very uniform and typical.
E. Chester .. ..	.. 2	Inclined to be easy, indifferent feeders at times.
B. Chester .. ..	.. 2	Type variable; excellent doers.
E. A. Smith .. ..	.. 1	Good size; long bodies; a nice pen.
C. Pickering .. ..	.. 1	"D" rather small; a good pen all round.
W. M. Glover .. ..	.. 1	A fine, big, typical pen.
H. Stacey .. ..	.. 2	Poor feeders; uniform; medium size.
O. Goos .. ..	.. 1	One of the best light pens for size and outline.
R. Gill .. ..	.. 2	On small side, possess stamina, and are uniform.
Oakleigh Poultry Farm	.. 2	Variable type; rather narrow; great headpieces; excellent feeders.
E. Stephenson .. ..	.. 2	Variable type; two inclined to be dwarf.
R. Cole .. ..	.. 1	Uniform; hard; good doers.
Mrs. E. White .. ..	.. 2	Narrow; variable tail carriage; nice headpieces.
W. Wilson .. ..	.. 2	Side spikes in evidence; one dwarf.
H. C. Thomas .. ..	.. 2	Type mixed.
Mrs. E. Z. Cutcliffe .. ..	.. 2	Inclined to be leggy.
J. W. Short .. ..	.. 3	Two very small; size generally uneven.
Linquenda Poultry Farm	.. 2	Very poor feeders; could do with more substance.
F. Birchall .. ..	.. 1	Good all-round pen; very nice headpieces.
Brampton Poultry Farm	.. 2	Variations in type and headpieces.
Bathurst Poultry Farm	.. 1	Even in type and size; a nice pen.
P. M. Newberry .. ..	.. 1	Another even pen; excellent doers.
J. Barron .. ..	.. 1	Excellent bodies and very uniform; amongst the best.
W. Becker .. ..	.. 1	Good heads and legs; uniform.
J. Ryan .. ..	.. 4	Small size; fine bone; no colour or type.
Tom Hart .. ..	.. 2	Side spikes in evidence; the usual class of laying Orpington.
Rev. A. McAllister .. ..	.. 1	The most typical in the test; uniform; excellent headpieces.
J. Harrington .. ..	.. 1	Plenty of size; good type; colour good on entry.
J. Potter .. ..	.. 2	Side spikes in evidence; taily; rather fine in bone; grand eyes.
G. Cumming .. ..	.. 2	Variable in type.
G. Muir .. ..	.. 1	Not the largest; uniform in type; rather shorter in leg than the majority.
T. Fanning (B.O.) .. ..	.. 2	Side spikes on one; type variable. This pen contains four birds of the Australorp type.
J. Newton (B.O.) .. ..	.. 2	On small side; lower than the majority.
Jas. Every .. ..	.. 2	Side spikes on one; rather small; pale eyes in evidence.
T. Hindley .. ..	.. 1	Good eyes; uniform size; good doers; Australorp type.
R. Burns .. ..	.. 2	Variations "A" and "E"; light eyes; "D" and "F" more after the Orpington type; "A" large, resembling laying type.
E. F. Dennis .. ..	.. 2	Good eyes and tails; indifferent heads; Australorp type.
A. E. Walters .. ..	.. 1	Good bright eyes; uniform type; taily; Australorp type.
Geo. Kettle .. ..	.. 3	Feathers on shanks; side spikes; "C" nearest an Orpington.
Parisian Poultry Farm	.. 1	Grand heads and uniform; great workers; the Australorp type.
J. Ferguson .. ..	.. 1	Moderate size; uniform; incessant workers.
R. Holmes .. ..	.. 1	Good heads; Australorp type.

Name.	Class.	Remarks.
A. Shanks	1	Uniform; Australorp type.
J. E. Smith	2	Variations in type; "F" hen Australorp type.
E. Stephenson	2	Good eyes; variable type.
N. A. Singer	1	Plenty of size and bone; Australorp type.
E. Morris	3	"A" and "F" side spikes; variations in type, "A" and "C" as near the Orpington standard as any in the test.
N. Chaille	1	Excellent eyes; blocky and uniform.
E. Oakes	1	Good heads; blocky; lower than usual.
C. C. Dennis	1	Good eyes; uniform; Australorp type.
J. Cornwell	1	The Australorp type again.

THE FOWL TICK.*

By J. BEARD, Poultry Instructor.

Fowls that have been infested by ticks and recover become immune from further attack. This explains the reason why sometimes flocks of fowl are apparently in the best of health and condition, yet, if examined, they will be found to be covered with the larval ticks, and the houses may be found swarming with the pest.

Symptoms.—If clean fowls are put into these yards they will at once become affected and, in three or four days, the result of tick worry and inoculation by the pest, fever will be at its height. The fowls will appear drooping and listless, the combs becoming quite pale; they then lose the use of their legs. Severe diarrhoea sets in, death resulting in a few hours. The better condition the clean birds are in the quicker the poison will act. The fowl ticks themselves are infested with a parasite which they pass into the blood of the fowl, where it becomes a blood parasite, and the micro-organisms multiply with such marvellous rapidity that, in most cases, the fever causes the death of the birds. Every bird, in turn, becomes a centre of infection for healthy ticks that suck its blood, thus becoming in turn infected, and transmitting the blood parasites into a fresh victim. This disease is known as *Spirochaetosis* in fowls and is caused by a blood parasite. This tiny organism is conveyed from ticks to healthy fowls through the bite of the commonly known poultry tick (*Argas persicus*), its incubation period ranging from three to nine days.

The ticks are capable of transmitting the disease to healthy birds five months after feeding upon the blood of (*Sphirochaeta*) infested fowls.

All poultry, fowls, ducks, geese, and turkeys are subject to the disease, but the losses are always greater amongst the first mentioned. This may be accounted for by the fact that the latter are more restless in their habits, therefore the "seed" ticks have not such opportunities of attaching themselves to these birds.

Remedy and Prevention.—Once the ticks have firmly established themselves in the fowlhouse, it is almost impossible to eradicate them. Therefore the houses and fences should be burnt, likewise any trees that may have been in the pens, and the ground thoroughly disinfected with some strong solution. From experience the following have been found very effective remedies:—Pure kerosene, crude petroleum, creosote, or some of the standard dips, used at a strength of one part of the dip to three parts of water.

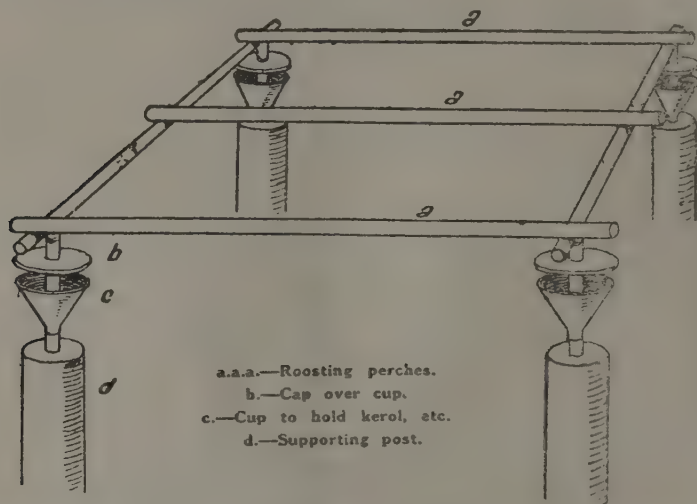
The new houses should be of iron, with as little woodwork as possible. The perches, which should be tick proof, can be procured at almost any ironmongery or poultry supply store. A good plan for a perch is to put two supports of sawn timber into the ground. Drive a nail into each at the top; bore a hole in each end of the perch so that the nail will just go through, and then lay the perch in the supports. This will keep it in position, and the perch can be lifted up to see if any ticks are underneath. Tie a piece of flannel round each support of the perch about half way up and, if there are any ticks about, you will in time catch them all, as after feeding on the fowls they will start for their hiding-place but, being full and lazy, will take the first shelter offering; thus you will find them under the perches or under the flannel. The latter can be removed and be burned along with the ticks that hide in it, and be replaced with fresh clean flannel.

Another method of tick eradication is described and illustrated by "W.R.M." (Sellheim, Q.), who writes in the current "Poultry" (19th November, 1921) as follows:—

"When I first arrived here I found the fowlhouse swarming with ticks, although no fowls had occupied it for four months. I pulled it down and passed all the

* This is a revision of an article that appeared in the "Queensland Agricultural Journal" for August, 1917, *op. cit.*, vol. viii., N.S., pp. 67-69.—Ed.

iron through fires of packing material, then burnt the wood. Then rebuilt and got no fowls for three months, first swinging the perches from the roof, with inverted bottles—full of kerosene—on the supporting wires from the roof; this was not stable enough, so I hit on a better plan. Taking some half-inch piping cut into two-foot lengths, I soldered on narrow cups—to hold kerosene or sheep dip—about 6 in. from one end. I then sunk blocks of wood into the ground, having bored holes into each block to take a piece of pipe. I used round saplings for perches, with a hole bored in both ends for the purpose of bolting the perches to the supporting pipes. It is nearly two years since I did this, and my fowls have not suffered from a visitation of the tick since."



a.a.a.—Roosting perches.
b.—Cap over cup.
c.—Cup to hold kerosene, etc.
d.—Supporting post.

Every care should be exercised to ascertain that all birds coming into the yard are clean and free from diseases and pests. If there is the slightest doubt, the birds should be placed in strict quarantine for nine days and the coops in which they have been kept thoroughly inspected. If young ticks are discovered clinging to the bodies of the fowls, the birds should be dipped in a strong solution of phenol or Cooper's sheep dip, which will kill the pests. After the birds have been dipped in the solution they should be given a teaspoonful of port wine every few hours, and kept in a dry, warm place.

If the fowlhouses are not badly infected the tick can be eradicated by thoroughly spraying with some of the solutions previously mentioned.

On account of its cheapness and the fact that it is so easily prepared, the following is recommended:—Boiling hot soapsuds, to which add $\frac{1}{2}$ oz. crude carbolic to the bucketful. The action of this solution is sure, and if properly applied it will penetrate into the smallest cracks and crevices, which a thicker solution would not reach.

Hot coal tar is also a good thing to use on fences and buildings, but care must be taken that it gets into all the cracks.

If whitewash is used, care must be taken that it is not applied too thick, because as the wash dries a space is left between it and the wood, which makes a good harbour for the pests.

There is yet another method which I have found to be very effective, and that is the use of a blow lamp (such as painters use). The heat and flame from this lamp will penetrate into the smallest cracks and kill all pests that may be concealed therein.

If the poultry-keeper will follow out these simple instructions, his yard should soon become free from the pest, and if it does not remain so he will only have himself to blame for lack of the precautionary measures suggested in regard to the introduction of fresh birds, coops, &c., or non-observance of those warnings contained therein.

CERTIFICATES OF SOUNDNESS.

November list of Stallions registered and certified as sound.

Name of Stallion.	Owner.	Address.
BLOOD STALLION.		
Flirtside	H. F. Hassell	Eumundi

FLOWERING TREES OF BRISBANE BOTANIC GARDENS.

TABEBUIA ROSEA.

NATURAL ORDER BIGNONIACEÆ (Trumpet Flower Family).

By E. W. BICK, Curator.

Derivation.—*Tabebuia*, said to be the native name in Brazil (Nicholson, "Dictionary of Gardening," Vol 4, p. 1); *rosea*, referring to the colour of the flowers.

Description.—*Tabebuia*, a genus embracing about sixty species of glabrous, pubescent or villous, erect trees or shrubs, natives of tropical America. They require similar treatment to that for *tecomas*, under which these plants are sometimes included.

Tabebuia rosea (D.C. Prodr., Vol. IX., p. 215—1855). Leaves made up of five leaflets borne on a fine stem (petiole) leaflets smooth, longish oval, sharpened point, blunt at base, centre one about 6 in., upper pair 5 in., and lower pair 3 in. in length, mid-rib very prominent at back of leaflet, lateral veins alternate, the whole bright green above, and lighter in colour beneath. Flowers numerous, borne in dense clusters at tips of small branches, in similar manner to those of the *jacaranda* and *tecoma* stans, to both of which it is closely allied. Calyx campanulate, two lipped, about $\frac{1}{2}$ in. in length, corolla tube abbreviated, pale yellow at throat when newly opened, fading to white when older, lobes five, ample, prolonged cover, recurved of a bright rosy pink, stamens four, in two pairs, from $\frac{1}{2}$ to $\frac{3}{4}$ in., style slightly longer, the whole flower being from 2 to 2 $\frac{1}{2}$ in. in diameter.

Habitat.—Mexico; also Guatemala. Described as *Tecoma rosea* by Bertol, "Flora Guatemala," p. 25.

In the Brisbane Botanic Gardens there is a tree, planted in 1903, of from 16 to 18 ft. high, near the kiosk; it is of erect growth, with light-brownish coloured smooth bark. The branches are of too upright a nature to make a good spreading head. The wood appears to be brittle. The tree flowers in November and December. Shortly before this, all the leaves from the top of the tree fall off and the flowers appear on the bare twigs; the dense clusters of rosy pink flowers have a fine appearance, and a large tree in full bloom would have somewhat the appearance of a large-flowered pink *jacaranda*.

Propagation.—From seed. Unfortunately this tree has not yet borne seed, but as the plants of this order are usually free in producing seed, probably it will, when older, seed freely.

GARDEN NOTES.

By E. W. BICK, Curator Botanic Gardens.

January being one of the hottest months of the year, special attention must be paid to watering. In the evening or at night is the best time. Dahlias and chrysanthemums must be kept well supplied. Thin out a lot of the superfluous growth from the centre of your dahlia plants, if they are inclined to make a lot of growth, and better flowers will result. Keep the flowers cut, and take off all the spent blooms; don't allow them to seed, and the flowering season will be prolonged. These fine flowers should be a feature in every garden for the summer and early autumn months.

Prepare seed beds or boxes for an early sowing of winter annuals, and towards the end of the month plant a small sowing of cineraria, primula, stocks, petunias, dianthus, gerbera, ranunculus, and anemone. These latter two are well worth growing in any garden. The great variety of beautiful colours, and their long stems and fine keeping qualities when cut, make them great favourites. A trouble that occurs at this time of year is that heavy rains often come along when the seed has just been sown, or when the young seedlings are in their first growth, and they are battered down and killed. If provision can be made for cover with hessian or calico that can readily be put on or off, so much the better. Should the first lot be lost, put in another straightaway.

Now is a good time for croton and coleus cuttings. Put nice, strong cuttings of the former in, and your young plants will be good, strong ones for a start. The cuttings do best in about half sand, with a little fine charcoal, cocoanut fibre dust, and a good light loam. Place them around the edges of 5 in. or 6 in. pots, and plunge them in the ground in a well-drained, sheltered position, or in a shaded frame, if available. Although the croton likes plenty of water, it does not like a sour, wet place. A few crotons planted out make a good show and are useful for cutting when flowers are scarce; they revel in a warm, sunny, well-drained position, a free soil, and should be sheltered from strong winds.

If there is any lawn work to be done, get it in hand as soon as possible. Cut out all *Paspalum dilatatum*, *Ehusine indica* (Crow's foot), *Sporobolus indicus* ('rat's tail'); fill up holes, and give a light top-dressing all over. Keep it well watered and roll occasionally, and your grass will soon improve.

Any plants of trees, shrubs, or palms planted out of pots will require shading and careful attention in watering for a few weeks, until they get a hold of the soil.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR NOVEMBER, 1921.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Thyra of Myrtleview	Ayrshire	31 July, 1921	1,382	3.8	58.48	
College Mignon	Jersey	7 July	778	5.1	46.42	
Iron Plate	"	12 July	964	4.2	45.82	
Hedges Madge	Holstein	15 Aug.	1,037	3.8	43.89	
Prim	"	9 Mar.	1,168	3.4	43.03	
Gatton Glitter	Guernsey	9 Sept.	785	4.8	42.51	
Miss Security	Ayrshire	20 Aug.	1,138	3.3	41.56	
College Evening Glow	Jersey	10 Oct.	833	4.3	39.99	
Bellona	Ayrshire	26 June	933	3.8	39.38	
Auntie's Lass	"	31 Oct.	925	3.3	33.77	
College Bluebell	Jersey	22 Oct.	607	4.6	31.05	
Miss Betty	"	7 July	648	4.2	30.58	
Buttercup	Shorthorn	28 Oct.	906	2.7	28.62	
Yarraview Snow-drop	Guernsey	14 Oct.	639	4.0	28.60	
Glow VI.	"	28 Aug.	658	3.7	27.17	
College St. Margaret	Jersey	25 Sept.	802	3.0	26.41	
College Cobalt	"	6 Jan.	421	5.1	25.22	
College Cold Iron	"	10 Mar.	494	4.3	24.11	
Miss Fearless	Ayrshire	26 May	512	4.0	22.45	
Dawn of Warragarra	Jersey	15 Oct., 1920	389	4.8	21.52	
College Grandeur	"	29 Dec.	350	5.2	21.59	
Netherton Belle	Ayrshire	30 Nov.	442	4.3	21.21	
Magret's Leda	Jersey	6 Oct.	357	5.0	20.88	
Hedges Nattie	Holstein	26 Feb., 1921	472	3.9	20.50	
Hedges Dutchmaid	"	26 May	450	4.0	20.11	

SUGAR: FIELD REPORTS.

The Southern Field Assistant, Mr. J. C. Murray, reports (2nd December, 1921) as follows:—

"In the course of the month of November the districts of Bundaberg, Avondale, Miara, Bingera, South Kolan, Bucca, and Gin Gin were visited. Included in the first-named area are the sub-districts of Woongarra, Fairymead, Barolin, and Gooburrum.

"*Woongarra*.—On the Woongarra area harvesting operations have finished. The cane has cut satisfactorily for the majority of the growers, who are now busy ratooning and cultivating the young plant crop. Dry weather is slightly checking the cane, but should rain occur before Christmas there is no danger of a serious setback.

"Generally speaking, agricultural operations connected with sugar-cane culture on the Woongarra have reached a higher standard than has been the case for some time. This is due to the fact that after the drought period that followed 1918, and the consequent deterioration of the crops, the farmers realised the necessity for thoroughly cleaning up their ground for the 1920 planting. This meant that the great bulk of the area was ploughed and cleared of old stools, and fresh cane planted, more care being taken in plant selection than is usually the case. There is yet, however, need for more crop rotation and vegetable manuring in these volcanic soils if canegrowing is to be successfully maintained until irrigation is accomplished. On some Woongarra farms cane has been grown continuously for forty years without a break or crop rotation of any kind, and therefore it is not surprising that these farmers get poor tonnages, even in wet seasons.

"Q.813 is doing well, the young plant cane of this variety looking very vigorous and promising a heavy tonnage for next year.

"Shahjahanpur is also making a good showing, Fairymead having planted about 40 acres at Spring Hill plantation. It is not altogether advisable, as yet, to plant too much of this variety until it shows a tendency to thicken, and the trash to become less adhesive. This may come about by careful farming and the cane adapting itself climatically.

"Other varieties making a good showing are 1900 Seedling and Badila, the latter principally on Qunaba plantation. D.1135 is still considerably grown, but the necessity for changing this cane has arisen, and growers would be well advised to try such varieties as Q.813, Q.855, Q.285, Q.907, or M.1900 Seedling, wherever possible, in its stead. D.1135 is showing 'striped leaf' and 'gumming' in a widely distributed manner.

"In the Woongarra district certain standard chemical fertilisers are in use, but most of the farmers are doubtful whether they are obtaining positive results. The best plan for the growers to adopt with regard to the use of fertilisers is to go to the Sugar Experiment Station and study experiments that have been carried out on typical soils and take advantage of analyses performed.

"*Barolin*.—On the Barolin side the cane is a little better, if anything, than on the Woongarra area. This is probably due to the fact that the farms here have been favoured with scattered thunderstorms. The variety M.1900 Seedling is making a particularly good showing, especially down towards the Elliot Heads, where this cane is principally grown. Other varieties are making average growth, while the c.e.s. values obtained were uniformly good. The grub pest is in evidence in the Barolin areas, and farmers who are in the track of prevailing winds should, as a preventive measure, endeavour to remove as many of the feed trees as possible. Carbon bisulphide as a repellant would probably be useful. There is not, however, a sufficiently heavy infestation to cause alarm.

"The majority of farms are in good condition, the farmers recognising the value of a good tilth as a moisture-conserving measure.

"It is worth noting that while some farmers pay particular attention to their cane, they allow badly kept patches of sorghum and cowcane to abound near their fields. These grains, in many instances, serve as hosts for parasites, either insect or bacterial, and should be kept away from sugar-cane.

"As mentioned several times in previous reports, the use of lime and green manures is recommended. Lime would probably increase the potash value of the soil, and green manures would give it badly wanted humus.

"The cane variety showing the greatest hardihood in the district is Yuban. It is a greedy feeder, with an immense top, but really should be discarded for reasons set out in previous reports.

"Black Innis is showing promise at Gooburrum, and there are also some good strikes of D.1135. There is less disease showing here than at other places visited round Bundaberg, and insect parasites are negligible this year.

"The question of chemical fertilisation should be closely gone into here, and small plots established to try manures under local conditions.

"I was afforded every facility for looking over Fairymead plantation. Fertilisation is being carried out on a liberal scale this year, and, generally speaking, the cultivation is good. The management has planted a big acreage of Black Innis, and has, as well, considerable areas of D.1135, Yuban, Q.813, Shahjahanpur, and a number of other varieties well known in the Bundaberg district.

"*Avondale*.—Canegrowing at Avondale is making favourable headway, the growers interesting themselves considerably in modern agricultural methods. At Avondale plantation, the Manager (Mr. Leaper) is doing good work. A block of plant Q.813 and D.1135 Sport is the best plant crop I have seen for some time. It would be a valuable assistance to the farming community if any growers with quantities of the former variety would allow farmers to purchase a portion for plants next year, if possible. Owing to careful selection of plants, disease at Avondale has dropped to a minimum. This especially applies to 'striped leaf' disease. The usual borer infestation appears to be minimised this year. Small losses are occurring through the depredations of the indigenous cane rat.

"*Miara*.—Down the river at Miara the farmers are busy cultivating and planting. Their crop returns this year have been good, both in tonnage and density. B.208 gave the best returns, although this variety is showing in places secondary symptoms of 'striped leaf' disease. There is great need, therefore, to be careful in planting this cane.

"Other profitable varieties are N.G.40, D.156, D.1135, H.Q.426, and Green Goru. Of these canes, N.G.40 gave the highest average c.e.s. values.

"Green manures would greatly benefit the farms back from the river, as they are deficient in humus. Miara is a good canegrowing area, although small, and energetic farmers should do well. Transport is the principal drawback.

"*Bingera*.—Bingera and South Kolan districts have sent more than their average amount of cane to the mill this year. Bingera plantation had a big crop, and the management expects to be crushing until some time in January. High densities are being obtained, especially from the 1900 Seedling, which in some cases is going over 17 per cent. of c.e.s. Other canes doing well are D.156, B.156, Q.813, N.G.16, and D.1135. Good strikes are effected by soaking the plants in a solution of lime. The cane and ratoons look promising, chemical fertilisers having been used in many instances. These are mainly of the standard type, calculated to supply nitrogen, potash, and phosphoric acid in a concentrated form. The management attributes its success this year to deep and thorough cultivation, familiarity with the local soil conditions as a basis for chemical fertilisation, keeping the soil from becoming deficient in humus, careful selection of plants and changing, careful survey of cane, destruction of diseased plants, and irrigation.

"At South Kolan the farmers have some very fine crops of young plant cane and ratoons. They are keeping the land free of noxious weeds, and there is little evidence of insect parasites. The cane giving the best returns, however—1900 Seedling—is not ratooning as well as it might, owing to the presence of a disease in the stools. Other cane varieties which look well are Cheribon, Brisbane Seedling, D.1135, and N.G.16.

"*Bucca*.—At Bucca the farmers' prospects look better than has been the case for years. The roads have improved, although they are still pretty bad, and the organisation of the industry as far as transport to the mill is concerned has much improved. The farmers are still cutting, and the ratoon cane is coming along nicely, especially the young plant crop. The fields are well cultivated and free from weeds, and although a slight borer infestation appears at intervals, natural enemies are a controlling factor. An occasional grower is having some difficulty with his cane, in cultivating, owing to the rocky nature of the ground.

"Cane varieties recently obtained from the Sugar Experiment Station are Q.813, Shahjahanpur, E.K.1, and Q.1098. Of these, the two lastnamed are making a good showing. Q.813 is backward, but strong. Shahjahanpur is stooling heavily, as usual, but thin.

"*Gin Gin*.—At Gin Gin the canegrowers want rain. The ground is getting dry, although it still contains enough moisture to sustain the cane for some time yet. The farmers have had a good crushing this year, the cane being of good sugar content and cut with a minimum of industrial friction. The cane is ratooning well, and the

young plant crop is looking vigorous. Most of the growers are hard at work, and well-kept holdings are to be seen everywhere. Very little disease is showing, and the farmers have what might be termed a 'flying start' for next season.

"A visit was paid to that productive and well-situated belt of farm land on the river above Wallaville mill. This area should be ideal for irrigation if the farmers concerned could combine and make it an accomplished fact.

"*Maroondan*.—Farmers are still cutting. They have had heavy crops and high densities this year, and the cane is again growing strongly, although slightly affected by dry weather.

"Messrs. Sondergeld Bros. have an outstanding crop of plant cane (M. 1900), the result being achieved by constant and thorough cultivation and green manuring.

"There is no doubt about the tremendous improvement in texture given to these soils by green manures. Farmers' tonnages would be heightened if they could carry this out on a more extensive scale.

"Regarding varieties at Maroondan, the best plant crops appear to be 1900 Seedling, Q. 813, and D. 1135.

"I would advise the growers to increase their acreages of Q. 813.

"Summarising, the following principles could be more closely applied by numbers of growers in the different districts:—

- More careful selection of plants;
- Changing from dark soils to red soils, and *vice versa*;
- Thorough cultivation, especially in dry weather;
- Deep ploughing;
- Green manuring;
- Liming;
- Careful consideration and experiment before applying chemical fertilisers;
- Destruction of old stool suspected of containing disease; and
- Use of animal manure wherever possible."

The Northern Field Assistant, Mr. E. H. Osborn, reports (13th December, 1921) as follows:—

"*Mossman District*.—Early in November this area was visited. The mill had just finished a most successful crushing season, covering a period of seventeen weeks and accounting for a total of 62,165 tons of cane. The run was a very good one from every point of view, the cane being cut at very reasonable rates, and the constant supply of same was easily a record for the mill. Extraction was also good, and, in fact, everything worked in a very satisfactory manner, especially as no labour troubles of any kind, either in mill or field, caused friction or delay. Existing relations between the employers and employees in the district seem excellent.

"The approximate average density of the principal canes are as follows:—

Badila	13.61 c.c.s.
24 B (Green Goru)	13.04 c.c.s.
H.Q. 426	13.56 c.c.s.
D. 1135	12.64 c.c.s.
B. 147	12.51 c.c.s.

"The acreage cut was 3,804, giving an average per acre of 16.3 tons.

"For 1922 some 4,380 acres will be under crop, or an increase of 576 acres, and, as the cane has mostly got away well and is getting plenty of work put into it plus a fair quantity of manure, the tonnage figures for 1922 should show a decided increase on this year's output.

"Rat-poisoning with arsenic was also being carried out intensively by the company's officials, and, in connection with this, Mr. Muntz (Chairman of Directors of the mill) tells me that far better results are obtained with this poison than with strychnine. In a number of places I noticed that greyback beetles were coming out very freely, and in Cassowary and Saltwater some small plots of plant cane were said to be suffering from the effects of wire worms. Unfortunately, I could not obtain specimens of the latter, but, from observations elsewhere, the one said to be doing the damage at Mossman is somewhat different. In most places the young cane looks well, and ratoons are also coming away vigorously.

"On Mr. Crees's farm varieties were cut as a plant crop of 16-months-old, and, whilst the Badila and Hybrid No. 1 only gave a c.c.s. of slightly over 11 per cent., the Q. 903 was just 15 c.c.s.

"Manuring was being carried out generally as a regular thing, and I am informed by the mill authorities that the quantity of manure ordered this year is in excess of any other previous order. The following figures are of interest as showing the quantity and nature of the manures being used:—

Meatworks	..	..	..	350 tons
Sulphate of ammonia	..	..	..	200 tons
Basic super	..	..	..	150 tons
Shirley's 3.7	..	..	..	130 tons

830 tons

"As mentioned in my previous report, the need of lime seems to be very apparent.

"At Mr. J. Robins's limestone show at the 7-Mile, the outcrop seems very large, runs roughly north and south, and is said to be of excellent quality, analysing from 95 to 98 per cent. of lime. It is situated upon a fairly steep ridge overlooking the Mossman Mill permanent line, and within about half a mile of the rails.

"*Freshwater.*—The conditions were seen to be very healthy, and all the cane has made splendid growth. Some very heavy work has been done in this locality since February last. On the Caravonica Estate 292 acres of land have been grubbed of lantana, burnt off, ploughed, and planted. Some plant cane upon this holding cut 45 tons to the acre, first ratoons 32 tons, and second ratoons 25 tons, quite recently, the cutters on the plant cane averaging 8 tons per man per day.

"Near Redlynch station some fine cane is also to be seen. It is mostly very clean, and looks remarkably well. At the time of my visit Mr. Surveyor Rutherford was engaged by the Colonial Sugar Refining Company in laying out horse-tram lines and permanent engine lines to harvest next year's crop from this locality. The scheme is a big one, and comprises about 2 miles of permanent engine line from the present terminus of the Colonial Sugar Refining Company's line to Edge Hill, whilst some 3½ miles of horse tram line and a bridge are to be built over the Barron from Redlynch station roughly in the direction of Caravonica. A further mile of the same sort of line is to go from Redlynch to adjacent country, whilst yet another mile of similar material goes from Jungara railway station to serve nearby plantations. All this cane coming over the horse tram line to Redlynch will be derricked and loaded at Redlynch for transportation per the Government railway to Hambledon. The cane cut on properties adjacent to the permanent engine line at Edge Hill, will, of course, go direct to the mill. The completion of these lines means a very busy time for the Freshwater district in the near future.

"*Cairns.*—Some very good cane was observed. At Mr. H. C. Draper's Farm, Waree, the plant and also the recently-cut cane look very well. Mr. Draper uses green manure and limes, also subsoils, and the results of his lately-cut crops certainly prove his wisdom in doing so. He also uses mixed manures with the following results:—Plant cane, 45 tons to the acre—First ratoons, 32 tons; second ratoons, 30 tons; and some third ratoons are now cutting about 25 tons per acre. These figures speak for themselves."

THE COTTON INDUSTRY IN QUEENSLAND.

BY MAJOR A. J. BOYD.

Although cotton has been grown for many years in this State, and, during the Civil War in America, to great advantage both to growers and purchasers of the crops, there are still people who make it their business to try to impress agriculturists with the idea that they themselves, although they have never been engaged in agriculture in any form beyond the cultivation of maize and potatoes, hold as to the profits to be derived from the land devoted to some semi-tropical crop, and they emphasise the statement that it is impossible to make money out of cotton owing to the want of cheap coloured labour. This statement is made in face of the fact that since the introduction of cotton-ginning machinery by the Queensland Department of Agriculture, and the gratuitous distribution by that Department of cotton seed, the farmers who have planted it year after year have made good profits by their enterprise. Each succeeding year the number of growers has increased, and it is no exaggeration to say that many have succeeded in making more money per acre out of cotton than by any other crop, not excluding sugar-cane.

Lately, a gentleman (Mr. Crawford Vaughan, ex-Premier of South Australia) representing a British company formed for the purpose of encouraging the growing of cotton in some suitable country within the British Empire, has visited, among other territories, Queensland, for the second time this year. In a report presented to the State Premier, Hon. E. G. Theodore, on the progress of the movement, he stated that, having previously visited many tropical and semi-tropical countries where cotton is grown, he had come to the conclusion that Queensland to-day presents the best conditions for the industry.

"The British Government had," he said, "set aside a sum of £1,000,000 for the encouragement of cotton-growing within the Empire, a portion of which would be devoted to establishing the industry in Queensland." This fact alone warranted his company in deciding, after studying the climate, localities, soils, and means of transport from farms and plantations to a shipping port, that the cotton industry could be firmly implanted here on a very satisfactory basis. Matters had now progressed so far as the importation by his company of three up-to-date cotton-growing plants, which, presumably, include cotton gins, linter machines, baling presses, and other appliances. These will arrive here in time to deal with the next cotton crop, which is expected to be a comparatively heavy one, and will be set to work in three different districts where the most cotton is at present grown.

There is a large area under cotton this season in the State, and, notwithstanding a spell of dry weather in one or two districts, the crop, generally, promises to be a large one, and it is probable that more gins will shortly be installed.

Mr. Vaughan, on his first visit to Queensland about ten months ago, secured samples of Queensland cotton from several localities in the south, north, and west, some of which was grown on the coast, and others on the tableland and western plain country. On his return to England he submitted them for the opinion of cotton brokers, who unanimously commented most favourably on the samples as possessing all the best qualities of the more valuable cottons of other countries (probably including America, Egypt, Africa, and India) in respect of length and strength of fibre, colour, and other desirable attributes.

It has long been known that the western districts of Queensland, particularly the Warrego, Maranoa, Condamine, and other districts, including the Darling Downs, produce a very fine class of cotton, mainly Uplands (short staple). Very little Sea Island cotton has been grown, although this long-staple variety is of greater value than the Uplands, which are all short-staple, except some crossbred varieties, which carry a longer fibre, whilst the Sea Island is prized by cotton buyers for its length and silkiness of the fibre. The latter class prefer the saline atmosphere of the coast to the drier western plains, but it is probable that much of this variety will be sown next year, both on the coast and inland, when suitable seed is available.

On the first introduction of cotton-growing in Queensland (about the year 1858) the Sea Island variety was grown in the Logan district, but conditions there appear not to have been favourable for its cultivation in those early days. Furthermore, the only gins brought out by intending growers were small, hand-driven machines which were unable to turn out more than a few pounds of lint per day. The present-day saw-gins will turn out up to 2 tons a day, while the linting machines will remove all fluffy cotton adhering to the seed of Upland cotton after the latter has passed through the saw-gin. A large quantity of cotton which was formerly thrown away with the seed is now saved by means of the "linterer." Roller gins are used for long-staple cotton. It is singular that, although experiments without number have been made by planters and others in the hybridising and crossing with the best varieties of Sea Island, Egyptian, and other cottons, few of the new kinds have been obtainable, even from America or from other centres of the cotton-growing industry, the only ones in Queensland being Russell's Big Boll, Jones's Improved, and one or two others.

One thing—and this is a most important point in favour of Queensland as a cotton producer—is that the plant is practically free from diseases which are ravaging the cotton districts of the United States and Egypt to such an extent that the States, it is feared, will not be able to produce a 14,000,000 bale crop, and supply their own cotton factories as well as producing an exportable surplus.

There is nothing new to say about cotton-picking machines. A reference to past numbers of the "Queensland Agricultural Journal" will suffice to show that the successful mechanical cotton-picker has not yet made its appearance in any part of the world. A machine which gave promise of great success was, some years ago, invented by Mr. Daniel Jones, one of the pioneer cotton-growers of West Moreton, and to whose enthusiasm and practical knowledge the present encouraging condition of the industry is largely due. This machine eventually was not so successful as was anticipated. Since then, others have appeared on the scene, only to suffer a like

fate. The latest one made the nearest approach to success. It worked by pneumatic suction. As the machine passed through the cotton rows, the bolls, or rather the cotton hanging from the burst bolls, was sucked from the open boll and passed in to a receiver. It had, unfortunately, one defect, which sent it to the limbo of former failures. The fault was that the powerful suction took in both ripe and unripe cotton. I have heard of no later invention.

But, considering all things, with a complete knowledge of the history of cotton-growing in Queensland and of the areas within our borders naturally adapted for its successful propagation, I have no doubt that the present revival in the cotton industry will end in cotton becoming a great wealth-winner, and one of our staple products.

ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, F.L.S., Government Botanist.

No. 25.

A WESTERN BURR (*Sida platycalyx*).

For some years past we have from time to time received samples of a large, flat, somewhat disc-like burr taken from wool received from Western Queensland. Beyond placing the burr as the seed-vessel (carcerulus) of some plant of the Mallow family, further determination was found impossible. Now, however, we have received from the Australian Estates and Mortgage Company, Limited, several specimens of the plant bearing the burr, gathered by Mr. P. Tully on Ray Station in the Adavale district. The plant proves to be *Sida platycalyx*. The genus *Sida* is one containing several very common weeds, such as the *Sida retusa*, *Sida acuta*, Flannel Weed (*Sida cordifolia*), &c.

Description.—A small woody plant, densely clothed in all parts with a woolly floccose, stellate tomentum. Leaves broadly ovate or orbicular, slightly cordate, crenate, 1-1½ in. long, on a petiole (leaf-stalk) of ½ to 1 in. long. Flowers on pedicels (flower-stalks) as long as the leaves, the pedicels articulate above the middle. Calyx broadly campanulate about ½ in. across, each lobe marked with three longitudinal ribs, with an intermediate rib on the tube below the junction. Lobes broadly triangular. Petals bright yellow, 6 to 7 lines long. Stamens numerous, staminal column short, carpels about 24, closely packed in a tomentose ring round the base of the styles, which are free almost to the base, with small capitate stigmas. Fruiting calyx enlarged, completely enclosing the ripe carpels (burr), marked with numerous longitudinal veins. Carpels echinate, with rather long hirsute spines, indehiscent and adherent to one another, forming a ring or disk-like burr nearly 1 in. in diameter and ½ in. in depth. Seeds greyish-brown, 1½ lines long, oval or somewhat kidney-shaped.

Distribution.—North Australia, Central Australia, New South Wales (?), and Western Queensland.

Botanical Name.—*Sida*, believed to have been the Greek name of some plant of the Mallow family; *inclusa*, Latin, meaning confined, referring to the burr being enclosed in the enlarged calyx.

Germination.—The method of germination is worthy of note; the carpels, unlike most species of *Sida*, *Malva*, *Abutilon*, &c., are indehiscent; that is, they do not split open and shed the seeds. Instead, the whole burr becomes buried in the soil and several seeds germinate. The burr remaining in the ground round the plants can be seen as in the accompanying illustration.

Botanical Notes.—*Sida platycalyx*, F. v. Muell. Herb., Benth. "Fl. Austr.," I., 197; Bail. "Queensl. Flora," I., 115; F. v. Muell., "Vic. Naturalist," V., 138. *Sida inclusa*, Benth. "Fl. Austr.," 197; Bail. "Queensl. Flora.," I., 115, F. v. Muell. "Fragm. Phytogr. Austr.," IX., 131, and XI., 32.

Sida platycalyx was described from flowering and *Sida inclusa* from fruiting specimens. They were originally described on the same page in the "Flora Australensis," and from the complete specimens now to hand I have no hesitation in uniting the two. *Sida platycalyx* has been recorded by Mueller l.c. from the Bulloo River, South-Western Queensland. He also records it for New South Wales in his Second Census, but Maiden and Betche in their recent "Census of New South Wales Plants" do not recognise it as a New South Wales species. It is most likely that it does occur in the North-Western parts of that State, though several records are made by Mueller in his "Second Census" that cannot be backed up by authentic material in any of the larger Australian Herbaria.

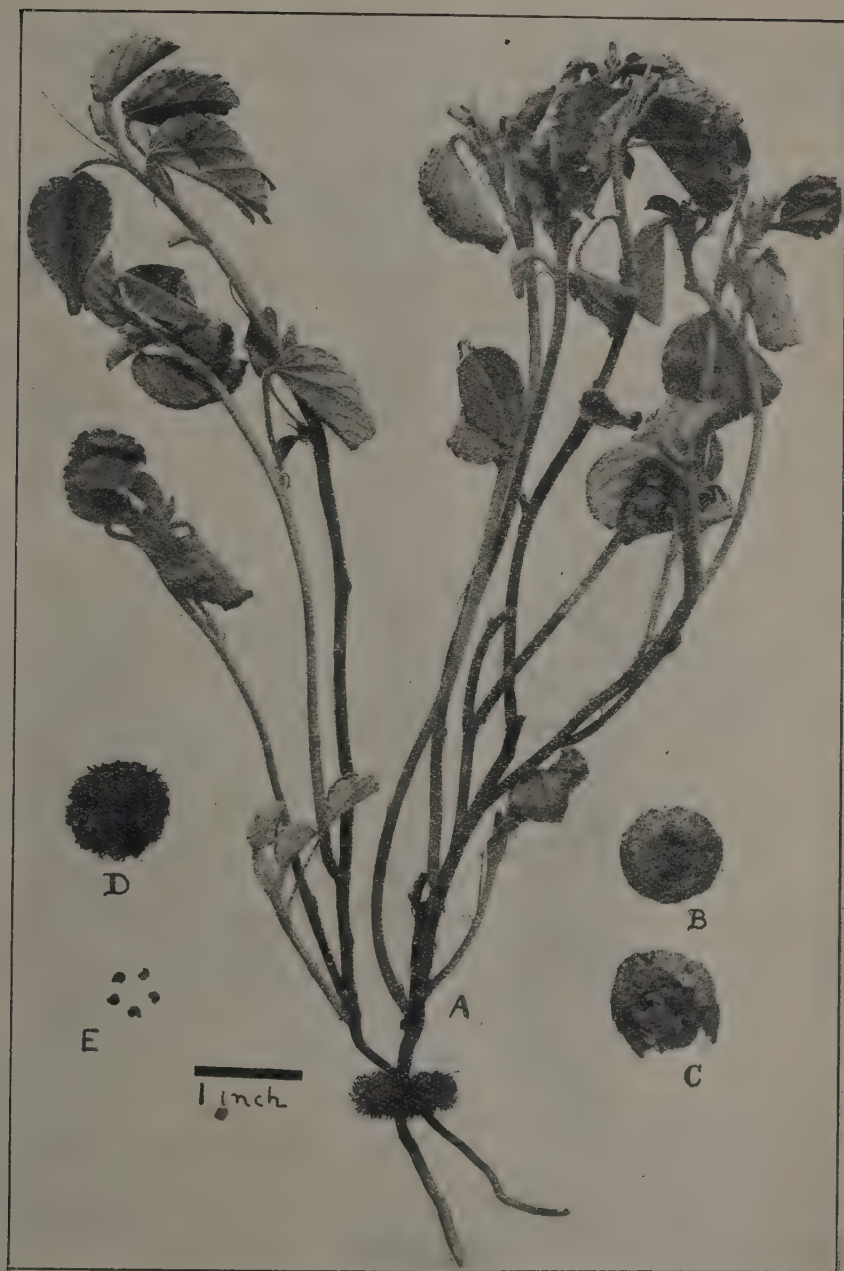


PLATE 15.—A WESTERN BURR (*Sida platycalyx*).

- A.—Two plants growing from an old Burr.
- B.—Burr enclosed in the enlarged calyx (viewed from below).
- C.—The same (viewed from above.)
- D.—Older Burr freed from the calyx.
- E.—Seeds.

TWO VINES REPUTED POISONOUS TO STOCK.

Recently the Stock Inspector at Beaudesert (Mr. J. H. McCarthy) forwarded to the Department two specimens of vines which he suspected as causing losses among stock in his district.

In one case the loss of five head of calves was reported on a property at Tambourine Mountain, and it was noticed that the calves had eaten freely of a particular vine known locally as "Milk Vine." On examination by Mr. C. T. White, F.L.S., Government Botanist, this proved to be *Marsdenia rostrata*, a plant of the family *Asclepiadaceæ* and a close ally of the *Hoya*, which is well known as a vine poisonous to stock. The family *Asclepiadaceæ* is one that contains several poisonous plants, both in Australia and abroad, so it is quite likely that the *Marsdenia* was in this case the cause of the trouble. It is a soft vine with rather light-green leaves, and bears tufts of white *Hoya*-like flowers in the leaf axils. Every part of the plant, when broken, exudes a milky sap.

In the other case several losses were reported from Kerry, and the animals were noticed eating a small vine growing in the forest country. This plant proved to be *Secamone elliptica*, of the same family as the *Marsdenia*. It is a slender vine with narrow leaves and small greenish flowers. When cut or broken, it exudes a milky juice. Both plants bear green pods (follicles) which, when ripe, burst open longitudinally, allowing the seeds to escape. The seeds are numerous in the pod, and each is provided at one end with a tuft of long white, silky hairs.

CANE-BEETLE CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (20th December, 1921) from the Entomologist, Mr. E. Jarvis:—

"EMERGENCE OF CANE-BEETLES.

"As a result of showery weather between the dates 26th and 31st October, which gave a precipitation of 1.40 in., 'grey-back' beetles emerged rather freely from volcanic and other soils around Gordonvale, in which pupation had taken place within reach of the plough. Pupæ located in such situations probably feel the effect of solar warmth earlier than those lying at greater depths or in heavy clay-loam lands. At Highleigh the first appearance of the pest attracted some attention, the beetles being very numerous on various food plants bordering the main road, and congregating in thousands on some large fig-trees (*Ficus benjamini*) close to the residence of Mr. J. Cannon. The native food plants found to be mostly affected in this district on 11th November were the Moreton Bay Ash (*Eucalyptus tessularis*) and one of the rough-leaved figs (*Ficus opposita*), the latter species, however, being, as a rule, seldom eaten unless far removed from other more favoured feeding trees.

"Twenty-nine beetles were collected from one of many small bushes of eucalyptus about 5 ft. high, growing on a roadway in the midst of cane land, fifteen of these being male and fourteen female specimens.

"Again, forty-eight beetles collected earlier, at random, from gums around the laboratory close to canefields, between the dates 4th to 7th November, and placed separately in cages for experimental purposes, were found, when examined after death, to consist of thirteen males and thirty-five females.

"The above figures substantiate data already published by the writer in 1915 ('Australian Sugar Journal,' Vol. VI., p. 891), and show the importance of collecting beetles from feeding trees close to headlands during the three weeks following emergence, before egg-laying commences. ●

"On the 18th November we had an additional fall of 1.36 in. of rain, and three days later a second lot of 'grey-backs' found their way to the surface. On one plantation of first ratoons at Meringa, for instance, as many as five beetles emerged from beneath each stool of cane, which means that the beetles arising from every acre of this land are sufficient to produce, later on, enough grubs to destroy fully 9 acres of cane.

"LIGHT TRAPS.

"Some rather interesting observations were made during several evenings between the 4th to 26th November regarding the tropic reaction of *albohirtum* to artificial light. The trap employed was a simplification of that designed and figured by the writer in 1916 ('Australian Sugar Journal,' Vol. VII., p. 903); and in the present instance consisted of an empty kerosene case fitted with side platforms and vertical barriers of galvanised iron, the latter being glazed where coming opposite the burner of an acetylene lamp of 21 litres capacity.

"Early in the month few beetles were caught, as the moon happened to be nearing the end of its second quarter, and, moreover, temperatures between the hours of 8 to 9 p.m., while beetles were on the wing, were rather low. During these few nights it was noticed that grey-backs, when approaching the trap, were inclined to circle around it, influenced possibly by the moonlight, and that, if failing after several short flights to reach their objective, ceased to be attracted, and suddenly became motionless. When this stage had been reached a bright flame placed 2 in. from the head of the beetle did not affect it in the least, clearly indicating a cessation of positive phototropic reaction for the time being. On the 26th November, from 8 to 9 p.m., four specimens of the so-called Christmas Beetle (*Anoplognathus boisduvali*) entered the trap, and only fourteen grey-backs, the temperature having dropped in the course of an hour from 82 to 72 degrees Fahr.

"Beetles belonging to the second emergence will commence invasion of the canefields about the 10th December, when it is hoped to secure further data regarding the influence exercised at that time by artificial light on male specimens and egg-laden females.

"ATTRACTIVE AROMAS FOR CONTROLLING CANE BEETLES.

"This line of work has consisted in the preparation and exposure in the field and feeding trees during night time of various odours, one of which, it is hoped, may be found attractive to the adult beetles.

"The principal substances experimented with have been (1) those considered likely to prove palatable as food; (2) chemicals possessing aromas resembling those emanating from the chief food plants of the beetle; and (3) miscellaneous odours such as arise from decaying vegetation, soils, roots, &c.

"This experimentation is of decided importance, as in the event of any success being obtained, it would then be a simple matter to design suitable traps, which, when baited with the attractive substance, could be so arranged in a canefield as to lure to destruction from different directions most of the invading beetles.

"It may be of interest to state that my hopes regarding this form of control were stimulated after making a microscopical examination of the antennæ of *albohirtum*, our common grey-back cane beetle. The sense of smell in insects is known to reside principally in these organs, and in the case of the beetle under consideration the laminae, or plates composing the antennal club, are very highly specialised, the surface of each of the four plates in that of the female being closely covered with many thousands of minute pits or pori, each containing a central rod connected with the olfactory nerve. I found these pits to occur in even greater numbers in the club of the male, which is provided with an additional plate for their accommodation.

"Doubtless it is this keenness of scent which enables our cane beetle to locate from a distance certain favourite feeding trees.

"This line of research is well worth investigation; and should any grower chance to notice grey-back beetles assembling in numbers on or around objects other than feeding trees, in such manner as to suggest their having been attracted, it would be advisable to communicate at once with the entomologist, either by wire or 'phone (Tel. 95 Gordonvale). The accompanying photograph illustrates experimentation with aromas exposed in traps hung among the branches of *Ficus pilosa*, and grey-back beetles eating the leaves of this favourite food-plant. The insect (one-third full size) shows characteristic injury.

"EGGS OF BEETLE KILLED BY FUMIGATION.

"On 19th November, eggs of the grey-back beetle were obtained from caged females in our insectary, and three days later placed in flower pots of moist soil and fumigated with carbon bisulphide.

"Two eggs were put in the bottom of each pot in a small cell roofed by a compacted piece of earth, and covered with from 130 to 280 cub. in. of soil. The bisulphide was then administered at distances varying from 4½ to 8 in., the dose in each case being two drachms (½ oz.). In field practice, if a couple of injections were given to each stool of cane, the above dose works out at about one drum per acre.

"Twenty-four hours after treatment the eggs were taken from each pot and placed in glass cells, in order that developments might be closely observed. Little change was apparent for two days, except that the treated eggs darkened slightly and did not increase in size; but on the 25th November (three days after fumigation) the control eggs had become noticeably larger and remained creamy-white, while the treated specimens were dark-brown and partially covered by mould.



Photo by E. Jarriss.]

PLATE 16.—EXPERIMENTATION WITH AROMAS AGAINST THE "GREY-BACK" CANE-BEETLE. Note bait-trap hung among branches of feeding-tree (*Ficus pilosa*). INSET.—Cane-beetles devouring foliage of same (3 full size.)

"By 1st December all that remained of the latter was the shrivelled egg-shells (chorion), each in the midst of a patch of mould on the soil; while the untreated eggs—submitted to exactly the same conditions of moisture and temperature—were perfectly normal, free from any sign of mould, and had developed to nearly a quarter of an inch in diameter. This experiment was repeated on 24th November, with varying doses of bisulphide, the same results being obtained in every case. We may safely conclude from the above details that such fumigation kills the eggs in a few hours, although, naturally, mould does not appear on the chorion until the internal albuminous matter commences to decompose.

"This discovery is not without value, since the knowledge gained enables us to start fumigation, if desired, as soon as the eggs are deposited, thus allowing more time in which to get over a big plantation while the cane is still small.

"TRAP-TREES FOR KILLING BEETLES.

"Continuing research work in this connection, initiated by the writer in 1915 ('Australian Sugar Journal,' Vol. VII., p. 62), five sets of experiments have been conducted between the dates 5th November to 2nd December, comprising eighty-nine cages containing leaves sprayed with various arsenical solutions. The data secured will be published next month.

"PARASITE OF MOTH-BORER.

"Three years ago (November, 1919) the writer was fortunate in breeding a *Braconid* wasp (*Apanteles nonagriæ* Oll.) from our large moth-borer of cane (*Phragmatiphilia truncata* Walk.).

"This parasite, which was first recorded by Oliff in 1893, is thought to be of great value in New South Wales, where it helps to control the ravages of the same moth-borer.

"It had not, however, been previously recorded from Queensland, so that its presence at Pyramid in 1919 is of considerable economic interest. As mentioned in my October report, we were hoping to obtain specimens of this useful parasite again, in order to breed numbers for distribution in the Lower Burdekin, or other districts where it is proving troublesome. I am glad to state that our search has been successful, and a number of specimens have quite recently been bred from ratoons collected at Banna, near Gordonvale.

"The subsequent rearing of these tiny wasps at the laboratory will be very interesting, as the technique and methods of handling such insects differ in many respects from those adopted when breeding tachinid fly parasites of the beetle-borer."

THE BANANA BEETLE BORER.

(*COSMOPOLITES SORDIDA* Chev.)

(*Curculionidæ*.)

[SECOND PROGRESS REPORT.]*

By JOHN L. FROGGATT, B.Sc., Entomologist in Charge of Banana Beetle Borer Investigations.

The observations and conclusions embodied in the following report cover the period from July to December, 1921.

(Plates 17 and 18.)

THE EGG.

Both field and laboratory observations have shown that oviposition has been continuous throughout the year. In the field, eggs have been found in corms and stems, while in the office the imagoes under observation (compare Table B) have deposited a large number of eggs in the pieces of corm on which they were feeding. In every case the eggs were laid singly, and generally just below the surface, in small, slightly-curved

* *Ib.* First Progress Report. Bull. Division Entomology and Vegetable Pathology, August, 1921. Reprint, "Queensland Agricultural Journal," Vol., XVI., pp. 200-8, Sept., 1921.

burrows. That eggs are deposited in the plant below the surface of the soil was shown in some plants in which the larval tunnels were well towards the base of the corn, no trace of tunnelling being present through the upper half of the corm. This is, however, not general.

The following table gives the total number of eggs laid in each month by these different lots of beetles under observation. The beetles in each lot (given in Table B) comprised a proportion of males, but one not always constant, their number too varied, as death lessened this.

—	A.	B.	C.	D.	E.	F.	G.	H.	I.	J.	K.	L.	M.	Total.
July	21	21	65	36	4	39	289	208	17	..	..	..	..	700
August	4	2	16	3	0	6	64	56	17	21	..	..	..	189
September	25	19	66	17	2	48	90	69	68	72	45	..	..	521
October	104	81	235	111	22	144	343	323	196	268	142	..	..	1,960
November	42	50	142	44	20	117	388	299	129	223	125	15	..	1,595
To 15th December ..	7	4	7	5	2	7	25	29	9	24	33	3	..	155
Individual totals July to 15th December	203	177	531	216	50	361	1,199	984	436	608	345	18	..	5,129
Laid 25/5/21-30/6/21	39	60	149	44	0	84	354	339	..	..	..	..	..	1,069
Full Totals ..	242	237	680	260	50	445	1,553	1,323	436	608	345	18	..	6,198

The egg production fell considerably with the cold weather, but did not cease completely, and recovered again with the advent of warmer climatic conditions. The marked drop in egg production in December is difficult to explain unless further observation shows the effect of hot weather to be similar to that of cold weather.

Oviposition does not seem to be marked into definite periods, as would occur with the development of one batch of eggs followed by a period of quiescence while another batch was developed, but rather to be a continuous function.

A large proportion of the eggs laid by these lots of beetles were transferred to incisions made in pieces of fresh corm, and were closely observed in order to ascertain the time taken for the egg to mature. The results of observation may be briefly summarised as follows:—

Eggs laid between 16th and 29th June, 1921, matured in 19 to 20 days (average).

Eggs laid between 29th June and 27th July, 1921, matured in 26 to 32 days (average).

Eggs laid between 29th July and 26th August, 1921, matured in 24 to 27 days (average).

Eggs laid between 29th August and 26th September, 1921, matured in 11 to 15 days (average).

Eggs laid between 26th September and 28th October, 1921, matured in 10 to 12 days (average).

Eggs laid between 28th October and 25th November, 1921, matured in 7 days (average).

The longest period passed in the egg stage was in the case of eggs laid between 25th and 27th July, 1921, the eggs maturing in 35 to 37 days. The variations of different series of eggs were more marked than are shown by these figures, but all showed the lengthening of the egg period as the cooler part of the year was being realised, and a

gradual decrease as warmer climatic conditions set in. The moisture content of the corm on to which the eggs were transferred as well as variations in temperature account largely for these variations. a dry condition of the corm as also a lowering of temperature inhibiting development.

[*Note.*—During the earlier portion of the period summarised above, great difficulty was experienced in carrying out this work through the development of fungus growths in the incisions in the corm to which the eggs were transferred. The long egg period allowed ample time for a heavy development of these growths which, often covering the eggs, destroyed a number of them, and always rendered observation difficult.

Small Staphylinid (sp.) larvæ and mites were also troublesome during the longer egg-periods.]

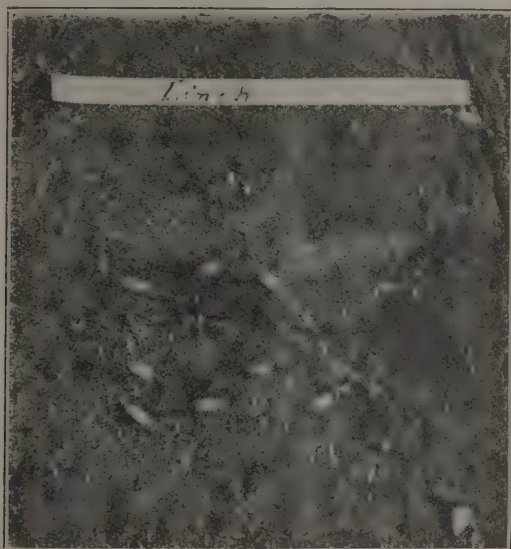


PLATE 17.—Eggs of *C. sordidus* transferred for observation.

LARVA AND PUPA.

On account of the larval and pupal stages being both passed within the corm, it has not always been possible to determine exactly the time passed in each of these stages. For this reason, generally, the larval and pupal periods have had to be calculated together and the period of each stage deduced from other independent observations.

It was found that from larvæ emerging in June and early in July, 1921, there were passed about 130 days in the larval and pupal stages, while from larvæ emerging in October there was passed less than half this time in the two stages; through November these periods were still further reduced. Details of these observations are given in Table A.

Pupæ collected in June matured in a minimum of 20 to 28 days, while in September this period was reduced to a minimum of 10 to 14 days. From this it may be assumed that the larval periods during the same time were at least 60 to 80 days and 30 to 40 days, respectively.

THE IMAGO OR BEETLE.

The average full life-cycle (from egg to imago), from eggs laid in June, was 120 days; in September, 62 to 63 days; in October, 48 to 59 days; in November, 31 to 33 days (only one observation).

No attractant or deterrent, either physical or chemical, has as yet been found effective for application to plantation requirements.

Continued observations on the length of life of the beetle show that it is a very long-lived insect. The results obtained from observations made on beetles feeding on corn in tins in the office that are embodied in Table B indicate this. In Lot F, for example, there have been no deaths since 9th May, which was only a few days after emergence of the beetles. In Lot A, collected 29th January, 1921, there are still 17 beetles alive (47.4 per cent.) out of a total of 38.

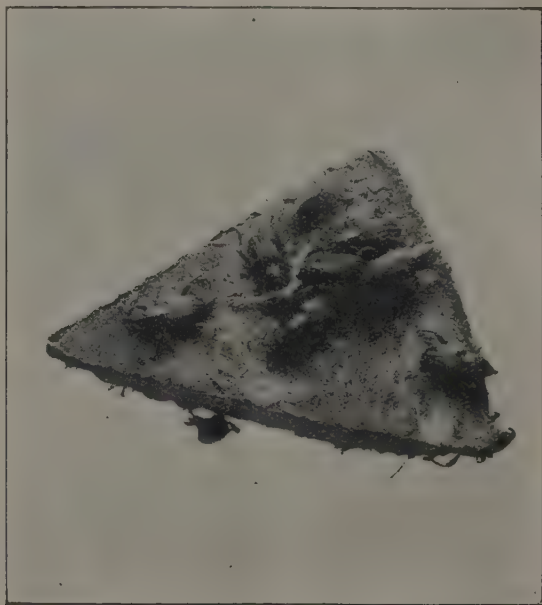


PLATE 18.—Newly emerged Imagos of *C. scordidus*.

The beetles comprising Lots E, M, N, and O were bred from pupæ; otherwise all the beetles were collected in the field, their age when taken being, of course, unknown.

During the winter months the rate of mortality amongst newly-emerged imagos was very high. This may have been due, in part, at least, to the rapid development of fungus growths on the corn affecting the imagoes before they were fully developed.

Both field and laboratory observations show that the imagoes will often begin to feed before they have attained their full (black) colour.

Eggs were deposited by the imagos of Lot E between 11th and 13th July, 1921; the imagos emerged from the pupæ between 22nd and 27th April, 1921, thus mating and subsequent development of eggs took place within 75 to 82 days of emergence of the imagos. With the imagos of Lot M this period was very much shorter; the imagos emerged between 11th and 27th October, 1921, and the first eggs were deposited between 14th and 17th November, 1921; thus mating and egg-development took place within a maximum of 34 to 37 days from emergence.

The Department, acting in co-operation with that of New South Wales, secured from Java a consignment of a predaceous beetle (*Placius javanus*), belonging to the Histeridae, an enemy of the banana beetle borer (*Cosmopolites sordidus*). This comprised 388 beetles, of which 304 were alive (slightly more than 78 per cent.). These were liberated in a small plantation where the banana beetle borer infestation was severe. They were liberated in this manner in order that they might be under closer control than if generally distributed, and under better conditions for observation. Jepson* states the period from egg to beetle of this parasite is a long one, so that it will not be possible to arrive at any conclusion on the activity of *P. javanus* for some time.

No indigenous parasites of *C. sordidus*, other than those mentioned in the First Report, have been found throughout the areas traversed.

PLANT RELATIONSHIPS.

Further observations in the field have failed to show any difference in the relative frequency of attack or relative degree of damage in different varieties of banana plants by *C. sordidus*. Neither has it been observed that disease of a plant, or plant portion, influences the selection of site for oviposition.

CONTROL.

It has been constantly found that, in "trapping" the beetle by means of corm "baits," the best "bait" is obtained by splitting the corm so as to include a small portion of the base of the stem; such baits present a moister surface for a longer time than those composed of the heart of the corm.

A series of tests has been started to ascertain the efficacy of poisoned "baits" as a means of destruction of the beetles. These tests are, however, not yet sufficiently far advanced to enable conclusions to be formed.

Old infested plantations that have been abandoned or left to run out are a most decided menace to the banana grower, as they represent large undisturbed breeding-grounds for the pest, from which it can, and does, spread into adjacent clean plantations. As an illustration of this point (one which cannot be too strongly stressed), a new plantation alongside an old infested area, though free from beetle borer early in the year, was found infested in the spring in the two rows adjoining the old area.

To reiterate previous advice on this matter, any old areas adjacent to plantations should be carefully examined, and, where beetle borer is found to be present, corm "baits" should be laid around the edge of, and, as far as possible, throughout the infested area; the baits must be carefully watched, and all beetles "trapped" must be destroyed. Whenever opportunity offers, it is to the grower's own advantage to dig out and destroy the infested material.

SUMMARY OF CONCLUSIONS.

1. The beetle has a long life, and the females deposit eggs continuously.

2. Breeding, although continuous throughout the year, is much slower in the winter months.

3. The results to date go to show how necessary it is to prevent the pest breeding by, as far as possible, destroying breeding-grounds and harbourage, and by destroying all beetles as soon after emergence as possible, by continuously "trapping."

* Jepson, Bull. 7, Dept. of Agric., Fiji, 1914. "... about six days in the egg stage, many months in the larval stage, and about four weeks in the pupal stage."

TABLE A.—PERIODS OF LIFE CYCLE.

Eggs Laid.	Larvæ emerged.	Larvæ Pupated.	Imagos Emerged.	Egg Period In days.	Larval Period in days.	+Pupal Period in days.	Full Life Cycle in days.
8-10/6/21	26-28/6/21	..	20/10/21	18	114-116	..	132-134
13-16/6/21	3-6/7/21	..	12-22/10/21	20	98-111	..	118-131
13-16/6/21	3-6/7/21	..	11/10/21	19-17	97-100	..	116-117
29/6/21-1/7/21	19-20/7/21	..	15/10/21	19-20	87-88	..	106-108
20-22/9/21	2-5/10/21	..	20/11/21	12-13	(46-49)	..	59-61
20-22/9/21	2-5/10/21	..	2-6/12/21	12-13	(65-72)	..	71-77
22-26/9/21	5-10/10/21	by 15/11/21	18-23/11/21	14-13	39-49	..	53-62
22-26/9/21	3-8/10/21	by 15/11/21	21/11/21	13-11	(44)-49	..	56-60
22-26/9/21	5-6/10/21	by 15/11/21	19-20/11/21	10-13	44-46	..	54-59
22-26/9/21	5-8/10/21	18/11/21	28/11/21	12-13	41-44	p.p. 10	6-67
22-26/9/21	3-8/10/21	..	2/12/21	12-11	55-60	..	67-71
22-26/9/21	5-10/10/21	..	2-3/12/21	14-13	53-59	..	67-72
22-26/9/21	5-8/10/21	..	30/11/21	12-13	53-56	..	65-69
26/9/21-5/10/21	8-16/10/21	by 22/11/21	22-28/11/21	11-12	37-51	..	48-63
26/9/21-5/10/21	6-16/10/21	by 22/11/21	22-28/11/21	11-10	37-53	..	48-63
26/9/21-5/10/21	8-17/10/21	by 22/11/21	26-28/11/21	12	40-51	..	52-63
26/9/21-5/10/21	6-16/10/21	by 22/11/21	22-28/11/21	11-10	37-53	..	48-63
26/9/21-5/10/21	6-17/10/21	by 22/11/21	26-28/11/21	12-10	(41)-53	..	52-63
20/9/21-6/10/21	15-20/10/21	..	2-12/21	14-16	43-48	..	57-64
5-10/10/21	17-23/10/21	..	1-11/12/21	12-13	40-55	..	51-67
10-13/10/21	21-24/10/21	..	1-11/12/21	11	39-51	..	49-62
10-13/10/21	21-24/10/21	..	1-11/12/21	12-11	37-51	..	49-62
10-13/10/21	21-24/10/21	..	1-11/12/21	11	39/51	..	49-62
13-18/10/21	24-30/10/21	..	1-11/12/21	11-12	32-48	..	44-59
13-18/10/21	23-30/10/21	..	1-11/12/21	10-12	30-47	..	44-59
13-18/10/21	24-31/10/21	..	1-11/12/21	13-11	31-48	..	44-59
13-18/10/21	24-31/10/21	..	1-11/12/21	13-11	31-48	..	44-59
18-21/10/21	30/10/21-3/11/21	..	8-11/12/21	13-12	35-42	..	48-54
21-25/10/21	30/10/21-3/11/21	..	8-12/12/21	9	35-43	..	44-52
21-25/10/21	30/10/21-3/11/21	..	8-11/12/21	9	35-42	..	44-51
25-28/10/21	2-7/11/21	by 8/12/21	12-13/12/21	10-8	35-41	..	45-49
9-11/11/21	16-18/11/21	by 6/12/21	11/12/21	7	24-26	..	31-33

TABLE B.—LONGEVITY OF IMAGOS.

—	A.	B.	C.	D.	E.	F.	G.	I.	J.	K.	L.	M.	N.	O.
Date Collected.	29/1/21	7/2/21	12/2/21	20/4/21	27/4/21	5/5/21	21/5/21	4/6/21	19/7/21	1/8/21	16/9/21	11/27/10/21	15/24/10/21	25/28/10/21
Number Collected.	38	132	281	37	16	87	379	324	85	119	72	6	24	20
% Alive on—														
1/7/21	61	29.5	34.5	86	56	98	97	98.7	..	..	..	..	..	..
5/7/21	61	29.5	34	86	56	98	97	98	..	..	..	..	..	..
7/7/21	61	29.5	34	86	56	96.5	97	98	..	..	..	..	..	..
11/7/21	61	29.5	34	86	56	96.5	97	98	..	..	..	..	..	..
13/7/21	61	29.5	34	86	56	96.5	97	97.6	..	..	..	..	..	..
15/7/21	61	29.5	34	86	56	96.5	97	97.6	..	..	..	..	..	..
21/7/21	61	29.5	34	86	56	96.5	97	96.3	100	..	..	..	..	..
25/7/21	61	29.5	34	86	56	96.5	97	96.3	100	..	..	..	..	..
27/7/21	61	29.5	34	86	56	96.5	96.8	96.3	100	..	..	..	..	..
29/7/21	61	29.5	34	86	56	96.5	96.8	96.3	100	..	..	..	..	..
13/8/21	61	29.5	34	86	56	96.5	96.5	96.3	100	100	..	..	..	..
19/8/21	61	29.5	34	86	56	95.4	96	95.9	100	100	..	..	..	..
24/8/21	61	29.5	34	86	56	95.4	95.8	95.3	100	100	..	..	..	..
30/8/21	61	29.5	34	86	56	95.4	95.8	94.7	100	100	..	..	..	..
20/9/21	55.3	20.5	34	86	56	95.4	95.2	94.1	100	100	100	..	..	..
22/9/21	55.3	20.5	34	86	56	95.4	95.2	93.8	100	100	98.6	..	..	..
26/9/21	52.6	29.5	34	86	56	95.4	94.7	93.5	100	100	94.4	..	..	..
6/10/21	52.6	29.5	34	86	56	95.4	93.7	93.5	100	100	88.0	..	..	..
10/10/21	52.6	29.5	34	86	56	95.4	93.7	92.6	100	99.1	88.0	..	..	..
13/10/21	52.6	29.5	33.4	86	56	95.4	93.6	92.3	100	97.4	88.9	..	..	..
18/10/21	52.6	29.5	33.4	86	56	94.3	93.1	91.9	100	97.4	86.1	..	..	..
21/10/21	52.6	28.8	33.4	86	56	94.3	93.1	91.7	100	97.4	80.6	..	..	..
25/10/21	52.6	28.8	33.1	86	56	93.1	92.4	91.7	100	96.6	80.6	..	..	..
28/10/21	50	28.8	33.1	86	56	93.1	92.4	91.7	100	96.6	80.6	100	..	..
4/11/21	48.2	28.8	33.1	86	56	93.1	92.1	90.7	98.8	96.6	80.6	100	..	..
9/11/21	48.2	28.8	32.7	83.8	56	93.1	91.8	89.9	98.8	96.6	77.8	100	..	..
11/11/21	48.2	28.8	32	83.8	56	93.1	91.5	89.9	97.6	95.8	77.8	100	..	..
14/11/21	48.2	28.8	32	83.8	56	93.1	91.5	89.8	97.6	95.8	77.8	100	..	..
17/11/21	48.2	28.8	32	83.8	56	93.1	91.5	87.9	97.6	94.9	73.6	100	..	..
21/11/21	48.2	28.8	32	83.8	56	93.1	91.2	87.9	97.6	94.9	72.2	100	..	..
25/11/21	48.2	28	31.3	78.4	56	91.9	90.8	87.8	96.5	94.9	72.2	100	100	..
8/12/21	47.4	28	31.3	78.4	50	91.9	89.4	86.5	96.5	94.1	72.2	100	95.8	90
9/12/21	47.4	28	31.3	78.4	50	89.6	89.4	86.5	96.5	94.1	72.2	100	95.8	90
13/12/21	47.4	28	30.0	78.4	56	89.6	88.0	85.2	95.3	93.3	72.2	100	95.8	90
15/12/21	47.4	28	30.6	78.4	56	89.6	88.6	82.6	92.9	93.3	72.2	83.3	95.8	90

“Breeding-grounds” comprise old corms either in the stools or dug out and left lying on the ground, and also cut stems left lying on the ground. If these are chopped up into small pieces they will rot or dry up too quickly to allow time for the larvæ to reach maturity.

“Harbourage” consists principally of plant material lying in and around the stools. This forms an ideal shelter for the beetles. Decaying stems also form “harbourage” (and also, possibly, feeding-grounds) for the beetles.

CASTRATION OF THE FEMALE.

By A. H. CORY, M.R.C.V.S.

Ovariectomy (Speying).—The operation should be performed when the cow is in her prime and gives her greatest flow of milk, care being taken that she is in good health and moderate condition, not too plethoric; or, on the other hand, she must not be at all anæmic, and not in heat or pregnant. This operation may be performed in one of two ways—namely, by the flank or by the vagina—each operation having its special advantages. In the flank operation the animal may be operated upon either while standing or in the recumbent position. If standing, she should be placed against a wall or a partition and her head held by a strong assistant. The legs also must be secured to prevent the animal from kicking. A vertical incision should be made in the left flank, about the middle of the upper portion, care being taken not to make the opening too far down, in order to avoid the division of the circumflex artery which traverses that region. The operator should now make an opening through the peritoneum, which is best done with the fingers. Next introduce the hand and arm into the abdominal cavity and direct the hand backward toward the pelvis, searching for the horns of the uterus. Follow them up and the ovaries will easily be found. They should then be drawn outward and may be removed, either by the coraseur or by torsion. Closing and suturing the wound will complete the operation. An adhesive plaster bandage can be beneficially applied.

TAPE WORMS IN SHEEP AND LAMBS.

By A. H. CORY, M.R.C.V.S.

Symptoms.—Eight varieties of tapeworms are known to infest the bowels of sheep. Lambs will not fatten when harbouring these worms; they become unthrifty and hidebound, and the wool is hard and poor in quality. The animals appear stiff when moving, and generally hang behind the flock when being driven.

Tapeworms produce emaciation, with paleness of the mucous membrane of eyes, nose, mouth, &c. The function of the digestive organs is impaired, the cud being chewed irregularly, breath unpleasant, occasional colic, tympany of abdomen, and diarrhœa with mucus, in which is frequently found segments of the tapeworms. The sheep ultimately die from poverty and exhaustion.

Prevention.—Prevention consists in draining damp land, stagnant waterholes, &c., and by keeping uninfested sheep from known infested pastures. Infested pastures should, where practicable, be ploughed or dressed with salt, lime, or sulphate of iron, allowing about $\frac{1}{2}$ cwt. per acre. Avoid overstocking.

Treatment.—For treatment of 6-months-old lambs, fast animals for eight or twelve hours, and give the following:—

Oil of turpentine	..	..	..	..	1 drachm
Powdered areca nut	..	..	..	..	25 grains
Extract of male fern	..	..	..	..	15 drops
Linseed oil	..	..	..	..	1 oz.

Repeat the dose once weekly for three weeks. Increase the dose according to age of animal.

Where it is not practicable to drench sheep, 25 to 60 grains of areca nut (according to size of animal) should be given to each sheep, on two or three occasions, mixed in some bran or other food.

A lick composed of one part sulphate of iron to eight parts of salt should be available to sheep in troughs, allowing about $\frac{1}{2}$ oz. for each adult sheep.



PLATE 19.—*LAGONARIA PATERSONII*.

A Flowering Tree of Brisbane Botanic Gardens described in the December Journal.
Natural Order Malvaceæ (Mallow and Hibiscus Family).

THE FRUIT-GROWING INDUSTRY III.

By ALBERT H. BENSON, M.R.A.C.

[*The concluding article of series, the first of which appeared in the November Journal, relating to marketing methods and problems and other matters of peculiar interest to Queensland fruitgrowers. The first article dealt with inter- and intra-State distribution; the second covered the possibility of developing oversea markets for fresh fruit; and in his concluding observations Mr. Benson reviews the various methods of fruit preservation and their applicability to Queensland products and conditions.*]

In the two previous articles I have confined my remarks to the marketing and distribution of fresh fruit. I now propose to deal with the question of storing fresh fruit when markets are over-supplied, and holding it for price improvement.

Fruit storage, obviously, relieves glutted markets, prolongs seasonal periods, stimulates demand, and increases consumption. As is well known, heat hastens the ripening of all kinds of fruit and cold retards it. It is, therefore, possible to store fresh fruit for a considerable length of time without deterioration, provided it is kept at a temperature that will suspend the ripening process. Different fruits require different temperatures. The hardier varieties of the temperate zone continue their development at a much lower temperature than tropical or sub-tropical products; in fact, firm varieties of apples and pears keep best at a temperature just above that at which they would freeze, whereas tropical fruit, such as the banana, develops (ripens) very slowly at 55 degrees F. Pineapples turn black at a temperature just above freezing point. Exact temperatures at which tropical and sub-tropical products may be stored are not definitely known, and experiments are now being conducted by the Queensland Department of Agriculture for the purpose of improving our present knowledge.

Many erroneous ideas exist as to the value of cool storage of fruit, one of the commonest being that any kind of fruit may be stored successfully, provided the temperature is right. No greater mistake could be made, as cool storage simply retards ripening, and once fruit is removed from store and placed under normal conditions it ripens very rapidly, and, if a quickly perishable product, soon decays. If it is of a long-keeping variety, its ripening proceeds much more slowly, and it can be retained for ample time to allow of its being retailed without appreciable loss. Cool storage merely retards development, and the fruit comes out practically in the same condition as when stored. The ripening process, which was suspended during the storage period, is resumed immediately on its return to ordinary conditions. It will, therefore, be seen that it is imperative to store only such fruit as may be held some time after release from the cool store; and it will not pay to store fruit that must be consumed immediately it is removed from store. Further, as cool storage costs something like 3d. per bushel case per week, it will not pay to hold inferior fruit. Only the very best, if stored for any length of time, may be profitably quitted.

As fruit does not develop or mature whilst in the cool store, it is essential for it to be fully developed, but not fully matured, before it is gathered, as immature fruit will remain unchanged in condition, and after release will not develop or ripen properly. Fully developed fruit will ripen when restored to normal conditions.

Fruit for cool storage should be perfect, consequently it should be handled, graded, and packed with the greatest possible care. Blemishes on fruit are intensified when the product is taken out of store and allowed to ripen. Selection is, therefore, limited to sorts that are good keepers and not easily bruised or otherwise blemished, such as firm-fleshed plums, apples, pears, clingstone peaches, grapes, and citrus varieties from which excessive skin moisture has been removed. Tropical fruits, such as unblemished pineapples and bananas, may also be successfully treated.

It will indubitably pay to store suitable temperate fruits for local consumption, but it is very doubtful if the storage of tropical fruits would prove equally profitable, except for such time as they may be in the cool store during transit to distant markets.

Many of the temperate fruits grown in this State are unsuitable for cool storage, as their edible condition is of comparatively short duration. They are soft, easily bruised, and rapidly rot if an attempt is made to keep them for any length of time. Generally they are fit only for immediate consumption, and this fact naturally limits their profitable production to the quantity that can be consumed during a limited period. The production, therefore, of such fruit, except in such quantities as available markets can absorb, is not recommended.

Having dealt with the markets for fresh fruit, we now come to the question of the best methods of preserving fruit for export. I do not purpose going into this

matter in detail, as it is a very wide subject and one more fitted for a text-book than a journal contribution; at the same time, as there is a very great deal of misunderstanding regarding fruit preservation, I think the following remarks will be useful to our growers:—

In the first place it must be clearly understood that only certain fruits, possessing specific qualities, can be preserved commercially; that is to say, profitably; though many other fruits not so suitable commercially, and which would not pay to preserve for the open market, can be preserved for home use. Several methods of commercially preserving fruit are in every-day use, and in order to be as brief as possible it is best to treat each separately and to see exactly what class of fruit is best adapted to each particular process.

1. *Drying Fruit.*—As the name implies, this method of preservation is simply the removal of superfluous moisture in fruit until the product is dry enough to keep without either fermenting or becoming mouldy. The drying is done either by exposing the fruit to the direct heat of the sun or by placing it in artificial driers, of which there are many types known as "Fruit Driers," "Evaporators," or "Dehydrators." The principle involved in all artificial methods of drying is the same, viz.:—The extraction of superfluous moisture from fruit by means of heat, which is generated in various ways and is applied to the fruit in the form of hot air.

Many kinds of artificial driers are now in use, some of which are very simple in their construction, whereas in others, such as up-to-date dehydrators, the hot air is under absolute control and the cost of treating the fruit is reduced to a minimum. There is a general want of knowledge amongst our fruitgrowers and others regarding the class of fruit that is most suitable for drying, many persons apparently thinking, if one can judge from the recent expressions of opinion that have appeared in the public Press on the subject of "Dehydration," that any kind of fruit can be treated successfully, and that, therefore, drying, or dehydration, as it is now called, will prove the means by which our surplus fruit can be utilised to advantage. I am sorry to say that I cannot agree with this opinion, as much of the fruit grown in Queensland is by no means suitable for drying, as, if so treated, it could not be converted into a marketable article that would realise a price high enough to pay the cost of manufacture.

In order to produce a high-class dried article, and there is no market for anything else, it is necessary to select fruits having high sugar content and firm flesh, that will dry heavy, for if the fruit to be treated is deficient in sugar, the dried product will be deficient in quantity and poor in quality.

Fresh fruit consists mainly of water containing a variable amount of sugar in solution, fibre, pectine or fruit jelly, and ash, and when the water is extracted only the sugar, fibre, pectine, and ash are left. If there is a deficiency of sugar or pectine in the fresh fruit, the dried product is of very little value, as it will consist largely of skin and fibre. In order to produce fruits, such as peaches, apricots, figs, raisins, grapes, sultanas, currants, or dates suitable for drying, they must be grown in a hot, dry climate, as sun heat is necessary to produce the sugar. It is for this reason that hot and dry districts, such as Mildura, California, Smyrna, Arabia, and Northern Africa have proved so suitable for the production of commercial lines of dried fruit. Prunes and drying plums can be grown in cooler climates, but even these fruits are richer in sugar and dry heavier when grown in a district having a hot, dry summer and an abundance of sunshine.

Apples of firm texture grown in cool climates, however, dry well, and ripe bananas may be converted into an excellent dried product known as banana figs, while the green fruit, when dried and ground, makes an excellent flour.

Regarding individual fruits, peaches must be rich in sugar and possess a solid, firm flesh. Yellow-flushed freestone varieties are the best. Apricots must be rich in sugar, the flesh firm and of a good deep colour, and free from fibre. Figs—only very rich, sweet, red-fleshed white varieties produce a first class dried article, such as the so-called Turkish fig of commerce, which is produced mainly in Smyrna, and latterly in both California and South Australia, under dry and hot conditions. Only certain varieties of grapes are suitable for the manufacture of raisins, sultanas, and currants, and they should be grown under hot and dry conditions, as they must be very high in sugar and allowed to become dead ripe if a good marketable product is required. As regards dates, this fruit is only grown to perfection in very hot and dry districts.

It will thus be seen that as far as this State is concerned there is no great chance of our competing successfully in the open markets with most dried fruits, as the climate of our principal fruit-producing districts is not as suitable for the production of fruits suitable for drying as other parts of the Commonwealth, and we would, therefore, be under a great disadvantage when competing with more favoured districts. Apples can be dried for home and local consumption, but as it takes 8 lb. of a good

drying variety to 1 lb. of dried fruit, which, as it is only worth, at the outside, one shilling, it does not leave a very big margin for the fresh fruit.

The question of drying pineapples has recently been given a large amount of attention, and it is to be hoped that it will prove a successful means of utilising this fruit. It is, however, a new industry, and a market will have to be made for the product, as it is practically unknown at present.

Since writing the preceding paragraph, confirmatory evidence of same has been received from the Queensland Agent-General in London, who states, when referring to a market for dehydrated pineapples, that "the London experience does not appear to be very encouraging," and backs this statement up by giving the following advice:—"It is believed that until the market is established, low prices would rule; consequently it is not advisable to send more than 5 tons for a beginning."

2. Canning Fruit.—The success of canning fruits depends on the sterilization of suitable varieties of fresh fruits by means of boiling water or syrup, and hermetically sealing such fruit. In commercial canning, the fruit, after being properly prepared, is placed in suitable cans, which are then passed through the exhaust, on emerging from which the syrup is added, the lid of the can put on, and the cooking completed. Fruit so treated keeps indefinitely, provided it has been thoroughly sterilized and the can is hermetically sealed.

The cost of canning is such that only high-class fruit will now pay to handle, and at present practically the only fruit we have in sufficient quantity to keep a cannery running is the pineapple. With regard to this fruit, we have proved that Queensland can put up a very high-class article, provided necessary care and attention is given to its preparation.

The Stanthorpe District is capable of producing a high-class yellow-fleshed cling-stone peach that is in every way suitable for canning, as we can get the size, colour, and firmness of fruit required for a first-class canned article. Recently a large number of suitable canning varieties have been planted, and these will be coming into profit shortly. High-class plums suitable for canning can also be produced, but so far the price realised for the fresh fruit prevents its being used for canning. The same remark applies to canning pears, such as the "Bartlett," and to apricots suitable for canning.

3. Jam Making.—Any good, sound, firm-fleshed temperate fruits, and all berries can be converted into jam, but watery, soft-fleshed fruits with a low sugar-content are not suitable. Apricots, all kinds of European plums, cherry plums, strawberries, cape gooseberries, and pineapples sell readily when made into jam, and there is a fair local demand for fig jam, and peach jam made from good, firm, yellow-fleshed fruit, but little demand for these jams for export, or for jams made from melons, apples, and other varieties of fruit, excepting a high-class apple jelly.

Good marmalade meets with a fair local demand, and I am of opinion that it is possible to build up a good oversea trade for this preserve.

4. Pulping.—This is a means of storing jam fruits during the height of a season, and holding them for final treatment until an opportunity for converting them into jam occurs. Only first-class jam fruits will pay to pulp, as there is no demand for inferior pulp, such as that made from watery peaches, nectarines, or Japanese plums, and it is only wasting time and money to put it up. Pulping consists of sterilizing the fresh fruit by boiling and storing it in hermetically-sealed tins till it is required for use.

5. Candying and Crystallising.—The Queensland climate lends itself to these methods of fruit preservation, and I believe that a profitable trade could be worked up by an energetic firm specialising in this line. We have proved that we can turn out candied peel equal to, if not better than, any produced elsewhere, and there is, therefore, no reason why we should not specialise in glace and crystallised fruits, for which there is a world's market.

6. Cider.—There is no reason why good cider should not be made in Queensland under artificial conditions, as it will be necessary to provide cool rooms in which to ferment the must. Even so, the cost of manufacture should not be excessive, and it would provide a market for a large quantity of fruit that would otherwise go to waste.

7. Sterilized Fruit Juice.—The sterilization of various fruit juices, such as pineapple juice and grape juice, and placing them on the market as temperance drinks, is another neglected branch of our fruit industry, but one that has become of very great importance in the United States since that country went "dry." It is an industry that should pay well here, as there should be a good demand for pure fruit juice, both for cooking and as a beverage. For the latter it would certainly be preferable and infinitely more wholesome than the majority of the so-called soft drinks now so largely consumed.

In this series of articles I have endeavoured to show the class of fruits to which our growers should confine their attention, how to obtain markets for such fruit in the fresh state, and the class of fruit that can be utilised by drying or otherwise preserving. In conclusion, I submit the following suggestions for the careful consideration of all growers:—

1. Only grow such varieties of fruit as your soil and climate is best suited for.
2. Grow only first-class fruit that can be used not solely for the fresh fruit trade, but that will keep and carry well and may be canned, dried, or otherwise preserved. Do not grow rubbish.
3. Handle your fruit carefully, grade it properly, and pack it honestly.
4. Encourage the consumption of fruit in every way you can by advertising its value as a food and as Nature's greatest gift to man for the preservation of his health. See that it forms a part of every meal, and is always present on every hotel dining table, either in the fresh or preserved form. Get everyone to eat fruit; and instead of over-producing fruit you will have to increase the size of your orchard to meet the demand.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF NOVEMBER IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING NOVEMBER, 1921 AND 1920, FOR COMPARISON.

Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.		Divisions and Stations.	AVERAGE RAINFALL.		TOTAL RAINFALL.	
	Nov.	No. of Years' Records.	Nov., 1921.	Nov., 1920.		Nov.	No. of Years' Records.	Nov., 1921.	Nov., 1920.
<i>North Coast.</i>					<i>South Coast—continued:</i>				
	In.		In.	In.		In.		In.	In.
Atherton ...	2.15	20	Nil	0.59	Nambour ...	3.85	25	3.98	6.57
Cairns ...	4.16	39	2.80	4.66	Nanango ...	2.61	39	1.09	3.05
Cardwell ...	4.21	49	0.42	2.87	Rockhampton ...	2.17	34	1.93	3.24
Cooktown ...	2.80	45	0.80	0.97	Woodford ...	3.18	34	3.56	6.25
Herberton ...	2.43	34	0.10	0.85					
Ingham ...	3.96	29	0.54	2.27	<i>Darling Downs.</i>				
Innisfail ...	6.48	40	0.89	4.89	Dalby ...	2.53	51	1.74	1.62
Mossman ...	4.80	13	1.12	4.18	Emu Vale ...	2.59	25	2.06	3.91
Townsville ...	1.88	50	0.01	0.73	Jimbour ...	2.38	33	1.79	2.18
					Miles ...	2.52	36	1.14	1.38
<i>Central Coast.</i>					Stanthorpe ...	2.72	48	2.24	2.19
Ayr ...	1.79	34	0.14	1.81	Toowoomba ...	3.30	49	1.34	6.06
Bowen ...	1.34	50	Nil	1.15	Warwick ...	2.57	34	3.36	2.76
Charlton Towers ...	1.62	39	Nil	0.15					
Mackay ...	2.04	50	1.46	1.92	<i>Maranoa.</i>				
Proserpine ...	3.14	18	0.94	1.46	Roma ...	2.07	47	1.12	0.99
St. Lawrence ...	2.38	50	0.53	1.48					
					<i>State Farms, &c.</i>				
<i>South Coast.</i>					Bungewongorai ...	1.99	7	1.77	0.76
Biggenden ...	2.72	22	2.42	2.56	Gatton College ...	2.70	22	0.48	3.33
Bundaberg ...	2.63	38	1.68	2.17	Gindie ...	2.12	22	0.05	0.85
Brisbane ...	3.69	70	3.24	6.28	Hermitage ...	2.59	15	2.81	3.89
Childers ...	2.79	26	3.24	2.29	Kairi ...	2.44	7	0.07	1.18
Crohamhurst ...	4.39	30	2.76	5.54	Sugar Experiment Station, Mackay	2.68	24	1.32	2.33
Esk ...	3.18	34	1.53	5.10	Warren ...	3.29	7	4.30	3.85
Gayndah ...	2.83	50	1.38	2.59					
Gympie ...	3.16	51	3.01	4.56					
Glasshouse M'tains	3.77	13	3.48	5.62					
Kilkivan ...	2.57	42	2.96	5.77					
Maryborough ...	3.10	50	3.32	2.58					

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for November this year, and for the same period of 1920, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND, State Meteorologist.

Editorial Notes.

Australia's Future.

The timely and optimistic note struck by Sir Denison Miller, Governor of the Commonwealth Bank, at a large gathering of financial men and journalists in Sydney recently, reminds us that citizenship of the Commonwealth is a privilege that cannot be lightly regarded. Of all the nations drawn into the vortex of the great war, Australia, perhaps, proved the most buoyant, and the remarkable figures quoted by Sir Denison Miller may be accepted as an index of Australia's great wealth, and, if given elbow room, a basis upon which to build a reliable forecast of a glittering future. During the war and pooling periods Australia sold to the Imperial authorities wool to the value of £175,667,000; meat, from Queensland and New South Wales, £10,309,000; butter and rabbits, £21,115,000; wheat (including flour in wheat equivalent), £51,000,000; and metals, £41,000,000. Australians have invested £270,000,000 in Commonwealth loans, £163,000,000 in State loans, and £153,000,000 amongst 3,256,319 depositors in the savings banks, making a grand total of nearly £741,000,000 invested. Over 1,000,000 heads of families own and live in their own homes. The number of sheep, cattle, and other live stock is sufficient for many more millions of people than the country at present carries, and in one State alone there is sufficient coal to last, at the present rate of consumption, for 10,500 years. In addition, there are unbounded supplies of minerals to be mined. If secured from external aggression and standing on the two legs of primary and secondary industry, with broad acres of virgin soil as the base of one and unlimited raw material of the other, Australia with Time on her side has a future the greatness which is but mistily perceived. Australians, 98 per cent. of whom are of pure British stock, have in their great White Continent one of the finest countries in the world, with illimitable resources and millions of acres of Crown lands suitable for settlement and development, and there is room for many millions more to share their shining heritage.

* * * * *

The Butter Position.

The present unsatisfactory condition of the butter market is due to a large extent to unnatural restriction of trade brought about by a continuance of the operation of war measures long after their necessity had ceased to exist. As the result of rigid rationing of butter in the United Kingdom there are now vast cold storage accumulations. The rationing was at such a rate that reduction of accumulated supplies became a very slow process, the channels of distribution were blocked, and newer consignments could not be cleared as they came to hand. A general decline in values followed, and the Imperial authorities in their wisdom did not deem it fit to quit stocks quickly and so make the first loss the least. Through their retention of the produce the market has become practically only a receiving one. As well as the consequent disorganisation of the industry, there is the fact that margarine manufacturers have been given another opportunity to popularise their product. When it became known here that it was the intention of the Imperial Government to immediately release stocks held in storage, an effort was made by those associated with the industry in Australia to persuade London to unload gradually, and therefore avoid a rapid declension in values and the grave possibility of reducing the industry to chaos. To this overture the Imperial people have made a definite proposition, but it is understood that, so far, the butter held by them has not been quitted. The market has become very appreciably affected in consequence, and at present it is hard to say what is the value of butter. It is significant that Tooley street has reduced the amount of the advance on surplus butter by about 2d. per lb. One possible way out of the difficulty is for the associated companies concerned to set up an intelligence section to ascertain what markets are available in all butter-consuming countries and offering the best opening for disposal. The present position could have been obviated to a large extent by releasing butter from store more quickly when consumers were clamouring for it. As it is, vendors are faced with the problem of selling two seasons' produce in one. The existing difficulty is probably only a temporary kink in market organisation, and is paralleled in the Japanese silk trade when, recently, over production was followed by a slump due to an effort to dispose of the product of two years' manufacture for one year's use of material. But at the back of the butter position is the minor menace of margarine, the manufacture of which increased to an enormous extent—as much as 10,000 tons per week—during the war.

A Butter Pool.

Among Queensland butter producers there is a pronounced feeling in favour of the creation of a butter pool, and the Queensland Co-operative Dairy Companies' Association is taking the matter energetically in hand. The slump in butter and the uncertain conditions that have ruled in respect to export since the return to open marketing has directed the minds of manufacturers to the desirability, if not the necessity, for complete co-operation and co-ordination in marketing, both locally and overseas. In Victoria, where there was a rush for open-market conditions upon the termination of the Imperial purchase contract, and marked opposition to joining in with Queensland and New South Wales in the winter pool, producers now realise that they have lost thousands of pounds by standing out. The result is there appears to be a sharp revulsion of feeling in favour of constituting an all-embracing pool on co-operative lines.

General Notes.

A NEW WHEAT DISEASE.

In the course of a lecture delivered by Mr. F. F. Coleman, Expert under the Pure Seeds Acts, before the Toowoomba Chamber of Commerce recently, reference was made to the discovery of what appears to be a new wheat disease. The appearance of discolouration on the basal nodes and internodes of some wheat growing on the Downs led to a close investigation of the cause.

Specimens of affected wheat stalks, with grain attached, were procured and submitted to Mr. Henry Tryon, Entomologist-in-Chief, who, after obtaining and examining further specimens, advised that the symptoms of "disease" occurrence were due to the attacks of a minute mite that apparently establishes itself, in the first instance, in the sheathing base (or leaf sheaf) of the flag, and thence effects an entrance into the substance of the straw, especially in the neighbourhood of the node, where leaf-sheaf and culm unite. This disease has not previously been reported as associated with the wheat plant in Australia. The discovery shows that the customary precautions in examining seed wheat destined for agricultural areas are fully justified, and is an instance of the value of the work accomplished by lesser-known sections of the Department of Agriculture and Stock.

[Mr. Tryon informs us that this *Acarus* is a *Tarsonymus* comparable with the species noted by Reuter as injuring wheat in Finland.—Ed.]

PUBLICATIONS RECEIVED.

The Agricultural Gazette of Canada (Nov.-Dec., 1921), has among its leading topics an article descriptive of the efforts of the Dominion Live Stock Branch for the improvement of Canada's herds and flocks. Very practical assistance is given to farmers who, under the "Car Lot Policy," are paid reasonable travelling expenses to central stock sales for the purpose of purchasing stock for return to country points. In Eastern Canada the assistance is restricted to the purchase of female breeding stock—cattle, sheep, or pigs. In Western Canada the policy covers stores in addition to breeders. Purchasers are required to fulfill certain conditions in connection with their truckings and to give satisfactory assurance that none of the stock is purchased for speculative purposes. It is claimed that this policy has proved very valuable educationally, and not expensive. The cost of cattle shipped under its terms in the course of a triennial period averaged only 59 cents per head. Sheep in the same period averaged only 18½ cents per head. "The Free Freight Policy" is another scheme to assist the small stockowner. It was designed to prevent as far as possible the slaughter or exportation of useful heifers, young ewes, and young sows offered for sale on the open market at the central stockyards. Under this policy farmers are entitled to truck from saleyards to country points female breeding stock of the classes mentioned, freight free, provided the stock was not purchased for speculative purposes. "Cow Testing, 1920," is another contribution illuminative of progressive Canadian methods of herd improvement. An account of the organization of Alberta potato growers is also interesting to Queensland co-operators.

The New Zealand Journal of Agriculture (Dec., 1921), contains in "The Grasslands of New Zealand," an account of the application of the principles of pasture establishment. Other informative features are continued notes on commercial potato-growing, and account of sugar-beet trials and analyses, and notes on lucerne experiments at Ashburton, with special bearing on the fertilizer question.

The Canterbury Agricultural College Magazine (N.Z.) (Dec., 1921), is a bright production, containing an account of the student's doings. In an editorial it asks: "What are our ideals? To some this may be a startling question. The absorbing interests of our material, practical life are apt to crowd out and banish from our minds the question of our purpose and place in the community. But, however busy we are, and however little thought we give to it, one thing stands out clearly: We may not give verbal expression to our thoughts and ideals, but we 'live'—and by our lives we express our ideals."

The Journal of the Department of Agriculture of South Australia (Dec. 1921), has among its main topics an important paper on "Forage Poisoning" by Lionel B. Bull, D.V. Sc.

The Journal of Economic Entomology (U.S.A.) for June, 1921, devotes much space to the efficiency of grasshopper baits.

Dates and Date Cultivation of Iraq, parts I. and II., Memoir III., Agricultural Directorate, Ministry of Interior, Mesopotamia, by V. H. W. Dowson, is an account of the results of an investigation into the yield of date palms on the Shat Al 'Arab.

PREPARATION OF COTTON SEED FOR PLANTING.

Mr. W. H. Drummond (Springsure) writes:—

"I have planted 11 acres of cotton. . . . It is doing well, and I intend to plant a further 4 acres.

"For planting I used a maize drill, and found it a complete success, but only by the method I used. My method is as follows:—Boil 2 pints of flour in 4 gallons of water, place the cotton seed in this solution, squeeze or drain it, and then roll the seed in dry ashes, using an old washing tub for this purpose; then sift through a wire screen to separate matted seed; then spread out to dry. I found that by preparing the seed in this way it worked in the drill as easily as maize. I planted 4 acres a day as well as preparing the seed. Ashes and sand were tried by themselves, but this proved unsatisfactory. I found 4 gallons of boiled flour quite sufficient for the 11 acres."

Answers to Correspondents.

WORMS IN HORSES.

"INQUIRER" (Murgon)—

The Government Veterinary Surgeon, Mr. A. H. Cory, M.R.C.V.S., recommends the following treatment for worms in horses:—

"The horse should be stabled overnight and fasted. In the morning a drench containing 2 oz. of turpentine and 1 pint of raw linseed oil should be given (slowly and carefully). If the horse attempts to cough, lower his head immediately.

"The following powder will also be found beneficial if given in the morning in a bran mash or some damp food:—

Santonin	..	..	..	15 grains
Sulphate of iron	..	..	..	1 drachm
Gentian	..	..	..	4 drachms

"After three weeks' or a month's interval, the first drench can be repeated if thought necessary."

. ZAMIA.

P.J.—The Government Botanist, Mr. C. T. White, F.L.S., advises:—

"(1.) All members of the *Zamia* family (*Cycadaceæ*) are reputed to be poisonous to stock.

"(2.) All parts of the plants, with the exception of the core or pith, are reputed to be poisonous. The disease known as 'ricketts' has been induced by experimentally feeding the leaves to stock, but the seeds are generally looked upon as being more poisonous.

"(3.) Eradication in the taller-growing species, such as *Cycas media*, consists of cutting the stem down (it never shoots again), or a notch is cut in and an arsenical solution or other poison poured in. In the stemless species, such as the wild pineapple (*Macrozamia spiralis*) eradication is effected by driving an iron spike into the crown and working it backwards and forwards so as to damage the 'bulb' below, and to make the destruction quicker and surer an arsenical solution may be poured in. Where the plants are few in number they may be grubbed out.

"(4.) *Treatment of Affected Stock*.—Little can be done in this direction. The Chief Inspector of Stock, Major A. J. Cory, M.R.C.V.S., has recommended the following:—The first action to be taken is to prevent the animals gaining access to the plant, and a purgative should be given to the affected animals, consisting of $\frac{1}{2}$ to 1 lb. of Epsom salts in 3 pints of water, as a drench. After the drench has worked, the animals should be given the following powder, either mixed in food or in a pint of cold water:—

Potassium iodide	..	..	..	2 drachms
Powdered nux vomica	..	..	..	1 drachm
Powdered gentian	..	..	..	4 drachms

"(5.) *Uses*.—In Western Australia the core of the stem or bulb has been used as a stock food with a certain amount of success, the pith being grated or ground up and boiled in about twice its weight in water. As the solution cools it becomes thick and jelly-like, and is said to be useful as a food for pigs, poultry, and hand fed calves, the poisonous principle in the stem being rapidly removed by heat. The pith has also been spoken of favourably as a source of industrial alcohol."

POP CORN.

"Farmer," Mount Kent, Nobby.—The Director of Agriculture (Mr. H. C. Quodling) advises you as follows:—

"Climatic conditions and class of soil necessary for the successful production of maize are equally suited to the needs of pop corn, and land intended for its growth should receive the same careful preliminary cultivation.

"Sowings may be made from August, or as soon as all danger from frost is over, to early in January, in drills spaced 3 ft. apart, distributing the seed thinly, in order that the plants may be from 12 to 16 in. apart in the rows. Three to four pounds of seed are sufficient to sow 1 acre.

"Careful and frequent inter-row cultivation should be carried out, once the plant is above the surface and the rows can be distinctly defined, in order to keep down weed growths and prevent evaporation of soil moisture.

"Pop corn does not grow to the same height as that reached by larger-grained varieties, but carries a greater quantity of lower leaves, and, under favourable conditions, two and sometimes three cobs are produced on the one plant.

"The ear of pop corn, being smaller in diameter than that of ordinary corn, some adjustment of the corn sheller is necessary when threshing.

"Owing to the smallness of the grain, it will be found that greater efficiency is obtained and less waste occurs when the ear is husked prior to shelling. In using the husker and sheller, unless the riddles are of a large capacity, considerable grain is apt to be carried out, with the husk, especially when the machine is being run to its full capacity.

"Two of the most suitable varieties for Queensland conditions are white rice and golden tom thumb."

LANTANA POISONING.

S.F.S.P. (Gordonvale).—

1. There is no known method of dealing with lantana poisoning in horses.
2. There is no satisfactory remedy for lantana poisoning in cattle. Most cattlemen administer a strong purgative.
3. Get rid of the lantana.

PISÉ CONSTRUCTION.

A.M. (Mackay).—Mr. Morry, the departmental surveyor, to whom your inquiry was referred, advises as follows:—

"Adobe blocks should not be more than 12 in. by 6 in. wide and 6 in. deep. The time they would take to dry would depend on the weather, but with good drying conditions they should be fit to use in two weeks. No foundations other than the natural earth are required for pisé buildings, as stated in the specifications published in the Journal. The only mortar used is mud of the same material, freed from stones by running through a sieve while in a liquid state. It will afterwards thicken like putty and will then be fit to use."

J.E. (Moola).—

Your house has stood pretty well, considering the way in which it was built. Had wire netting been used on the saplings, the mud plaster would not have fallen off. If possible, even now wire netting should be put on in small patches where necessary, then plastered over with mud and thickened with some fibrous material. If netting cannot be used, drive nails into the saplings, then plaster as before. These will hold the plaster when patching is completed. Give it all, inside and out, two good coats of limewash.

WATERCOURSE BOUNDARY.

A.G.N. (Howard).—

The ordinary water line on each bank of the creek is the boundary of the properties on the frontage, consequently a property cannot be held to be completely enclosed unless fenced along the creek. Information re impounding laws can be obtained from your local shire clerk or at the nearest C.P.S. office.

ALGAROA AND CAROB BEAN SEED.

Supplies are expected from overseas. In the meantime applications for seed are being registered.

SWAMP GRASS (*POA AQUATICA*).

E.M. and other Inquirers.—

The Farmers' Co-operative Distributing Coy., Brisbane, are selling agents for this grass, and are prepared to supply roots at 45s. per bag f.o.b. Brisbane. This grass does not seed too readily, and is propagated usually by division of the roots.

GREEN SPOTS IN CHEESE.

W.P. (Nigger Creek, *via* Herberton).—The Chief Dairy Expert, Mr. E. Graham, advises as follows:—

"Green spots in cheese are attributable to the growth of pigmentary moulds. It is possible that the milk from which the cheese is made, or the cheese itself, may be affected with the mould. Generally, moulds of this class grow profusely on wood which is in a state of decay, and the organism is transferred from the decaying wood to the milk or the newly made cheese per medium of the atmosphere. It is possible to prevent the growth of mould injuring the cheese. Foremost, it must be remembered that moulds for their growth require both moisture and oxygen, and, provided that the rind of the cheese is firm and unbroken, it is then impossible for the mould growth to penetrate beyond the rind of the cheese, and when restricted in this way the quality of the cheese is not appreciably interfered with. It is only when the mould is able to penetrate into the cracks or crevices in the cheese that material damage to the quality of the cheese results. In toasting the surface of the cheese, the exterior of the face becomes sealed as a result, and it is then found that the mould growth is capable of doing little damage, and there is no doubt that if the outer lines of the cheese can be kept intact in the process of manufacture it will be found similarly impervious to mould growth, as the rind of the cheese readily dries out and fails to supply an adequate amount of moisture to permit of the serious growth of mould. Even if mould does attach itself to the exterior surface of the cheese, it may readily be removed by wiping the cheese over with a piece of clean hessian or other rough cloth."

Farm Notes for February.

Reference was made in last month's Notes to the necessity for early preparation of the soil for winter cereals, and to the adoption of a system of thorough cultivation in order to retain moisture in the subsoil for the use of crops intended to be raised during the season. The importance of the subject, and its bearing in relation to prospective crop yields, is made the excuse for this reiteration.

The excellent rains recently experienced should have a heartening effect on all farming operations, as a good season is assured.

Special attention should be given to increasing the area under lucerne (broadleaf Hunter River), wherever this valuable crop will grow. Its permanent nature warrants the preparation of a thorough tilth and seed bed, and the cleansing of the land, prior to sowing the seed, of all foreign growths likely to interfere with the establishment and progress of the crop. Late in March or early in April is a seasonable period to make the first sowing, providing all things are favourable to a good germination of seed.

Dairymen would be well advised to practise the raising of a continuity of fodder crops to meet the natural periods of grass shortage, and to keep up supplies of succulent fodder to maintain their milch cows in a state of production. Weather conditions, particularly the recent heavy and continuous rains, have interfered a great deal with farming operations. Although abundant supplies of grasses are in evidence, provision should be made for the inevitable period, at maturity, when these lose their succulence.

Many summer and autumn growing crops can still be planted for fodder and ensilage purposes. February also marks an important period as far as winter fodder crops are concerned, as the first sowings of both skinless and cape barley may be made at the latter end of the month in cool districts. Quick-growing crops of the former description suitable for coastal districts and localities, where early frosts are not expected, are Soudan grass, Japanese and French millet, white panicum, liberty millet, and similar kinds belonging to the *Setaria* family. Catch crops of Japanese and liberty millet may also be sown early in the month in cooler parts of the State, but the risk of early frosts has to be taken.

Maize and sorghums can still be planted as fodder and ensilage crops in coastal districts. In both coastal and inland areas, where dependence is placed largely on a bulky crop for cutting and feeding to milch cows in May and June, attention should be given to planters' friend (so-called imphee) and to orange cane. These crops require well-worked and manured land; the practice of broadcasting seed for sowing at this particular season encourages not only a fine stalk but a denseness of growth, which in itself is sufficient to counteract to some extent the effect of frost.

In the majority of agricultural districts where two distinct planting seasons prevail, the present month is an excellent time for putting in potatoes. This crop responds to good treatment, and best results are obtainable on soils which have been previously well prepared. The selection of good "seed" and its treatment against the possible presence of spores of fungoid diseases is imperative. For this purpose a solution of one pint of formalin (40 per cent. strength) to 24 gallons of water should be made up, and the potatoes immersed for our hour immediately prior to planting the tubers. Bags and containers of all kinds should also be treated, as an additional precaution. "Irish blight" has wrought havoc at times in some districts, and can only be checked by adopting preventive measures and spraying the crops soon after the plants appear above the ground. Full particulars on the preparation of suitable mixtures for this purpose are obtainable on application to the Department of Agriculture, Brisbane.

Weeds of all kinds, which started into life under the recent favourable growing conditions, should be kept in check amongst growing crops; otherwise yields are likely to be seriously discounted. The younger the weeds the easier they are to destroy. Maize and other "hoed" crops will benefit by systematic cultivation. Where they are advanced, and the root system well developed, the cultivation should be as shallow as possible consistent with the work of weed destruction.

First sowings may now be made of swede and other field turnips. Drilling is preferable to broadcasting, so as to admit of horse-hoe cultivation between the drills, and the thinning out of the plants to suitable distances to allow for unrestricted development. Turnips respond to the application of superphosphate; 2 cwt. per acre is a fair average quantity to use when applied direct to the drills.

Where pig-raising is practised, land should be well manured and put into good tilth in anticipation of sowing rape, swedes, mangels, field cabbage, and field peas during March, April, and May.

Orchard Notes for February.

THE COAST DISTRICTS

February in coastal Queensland is frequently a wet month, and, as the air is often heavy with moisture and very oppressive, plant growth of all kinds is rampant, and orchards and plantations are apt to get somewhat out of hand, as it is not always possible to keep weed growth in check by means of cultivation. At the same time, the excessive growth provides a large quantity of organic matter which, when it rots, tends to keep up the supply of humus in the soil, so that, although the property looks unkempt, the fruit-producing trees and plants are not suffering, and the land is eventually benefited. When the weed growth is excessive and there is a danger of the weeds seeding, it is a good plan to cut down the growth with a fern hook or brush scythe and allow it to remain on the ground and rot, as it will thereby prevent the soil from washing, and when the land is worked by horse power or chipped by hand it will be turned into the soil. This is about the most satisfactory way of dealing with excessive weed growth, especially in banana plantations, many of which are worked entirely by hand.

The main crop of smoothleaf pineapples will be ready for canning, and great care must be taken to see that the fruit is sent from the plantation to the cannery

with the least possible delay and in the best possible condition. The only way in which the canners can build up a reputation for Queensland canned pineapples is for them to turn out nothing but a high-class article. To do this they must have good fruit, fresh, and in the best of condition.

The fruit should be about half-coloured, the flesh yellowish, not white, of good flavour, and the juice high in sugar content. Over-ripe fruit and under-ripe fruit are unfit for canning, as the former has lost its flavour and has become "winey," while the latter is deficient in colour, flavour, and sugar content.

For the 30 or 32 oz. can, fruit of not less than 5 in. in diameter is required, in order that the slices will fit the can, but smaller fruit, that must not be less than 4 in. or, better still, $4\frac{1}{4}$ in. in diameter, and cylindrical, not tapering, can be used for the 20-22 oz. can.

Bananas for shipment to the Southern States should on no account be allowed to become over-ripe before the bunches are cut; at the same time, the individual fruit should be well filled and not partly developed. If the fruit is over ripe it will not carry well, and is apt to reach its destination in an unsaleable condition.

Citrus orchards require careful attention, as there is frequently a heavy growth of water shoots, especially in trees that have recently been thinned out, and these must be removed. Where there are facilities for cyaniding, this is a good time to carry out the work, as fruit treated now will keep clean and free from scales till it is ready to market. Citrus trees can be planted now where the land has been properly prepared, and it is also a good time to plant most kinds of tropical fruit trees, as they transplant well at this period of the year.

A few late grapes and mangoes will ripen during the month and, in respect to the latter, it is very important to see that no fly-infested fruit is allowed to lie on the ground, but that it is gathered regularly and destroyed. Unless this is done, there is every probability of the early citrus fruits being attacked by flies bred out from the infested mangoes.

Strawberries can be planted towards the end of the month, and, if early-ripening fruit is desired, care must be taken to select the first runners from the parent plants, as these will fruit quicker than those formed later. The land for strawberries should be brought into a state of thorough tilth by being well and deeply worked. If available, a good dressing of well-rotted farmyard manure should be given, as well as a complete commercial fertiliser, as strawberries require plenty of food and pay well for extra care and attention.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of peaches and plums, and of mid-season varieties of apples and pears, as well as of table grapes, will fully occupy the attention of fruitgrowers in the Granite Belt, and the advice given in these notes for the two previous months, with regard to handling, grading, packing, and marketing, is again emphasised, as it is very bad policy to go to all the trouble of growing fruit and then, when it is ready to market, not to put it up in a manner that will attract buyers.

Extra trouble taken with fruit pays every time. Good fruit, evenly graded and honestly packed, will sell when ungraded and badly packed fruit is a drug on the market. Expenses connected with the marketing of fruit are now so high, owing to the increased cost of cases, freight, and selling charges, that it is folly to attempt to market rubbish.

During the early part of the month it will be necessary to keep a careful watch on the crop of late apples in order to see that they are not attacked by codlin moths. If there is the slightest indication of danger, a further spraying with arsenate of lead will be necessary, as the fruit that has previously escaped injury is usually that which suffers the most.

Fruit-fly must also be systematically fought wherever and whenever found, and no infested fruit must be allowed to lie about on the ground.

Grapes will be ready for market, and in the case of this fruit the greatest care in handling and packing is necessary. The fruit should never be packed wet, and, if possible, it is an excellent plan to let the stems wilt for a day at least, before packing. This tends to tighten the hold of the individual berries on the stem and thus prevent their falling off.

In the western districts, winemaking will be in progress. Here, again, care is necessary, as the better the condition in which the fruit can be brought to the press the better the chance of producing a high-class wine.

Where necessary, citrus trees should be given a good irrigation, as this will carry on the fruit till maturity, provided it is followed up by systematic cultivation so as to retain a sufficient supply of moisture in the soil.

ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1922.	JANUARY.		FEBRUARY.		MARCH.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	5.0	6.51	5.24	6.46	5.45	6.25
2	5.1	6.51	5.25	6.46	5.45	6.24
3	5.1	6.51	5.26	6.45	5.46	6.23
4	5.2	6.51	5.27	6.45	5.46	6.22
5	5.3	6.52	5.28	6.44	5.47	6.20
6	5.4	6.52	5.28	6.43	5.48	6.19
7	5.4	6.52	5.29	6.42	5.49	6.18
8	5.5	6.52	5.30	6.42	5.50	6.17
9	5.6	6.52	5.31	6.41	5.50	6.16
10	5.6	6.52	5.31	6.41	5.51	6.15
11	5.7	6.52	5.32	6.40	5.51	6.14
12	5.8	6.52	5.33	6.39	5.52	6.13
13	5.9	6.52	5.34	6.38	5.52	6.12
14	5.9	6.52	5.35	6.38	5.53	6.11
15	5.10	6.52	5.35	6.37	5.53	6.9
16	5.11	6.52	5.36	6.36	5.54	6.8
17	5.12	6.52	5.37	6.35	5.54	6.7
18	5.12	6.52	5.38	6.34	5.55	6.6
19	5.13	6.52	5.38	6.34	5.55	6.5
20	5.14	6.52	5.39	6.33	5.56	6.4
21	5.15	6.51	5.39	6.32	5.56	6.3
22	5.16	6.51	5.40	6.31	5.57	6.2
23	5.17	6.51	5.40	6.31	5.57	6.1
24	5.18	6.50	5.41	6.30	5.58	5.59
25	5.19	6.50	5.41	6.29	5.58	5.58
26	5.19	6.50	5.42	6.28	5.59	5.57
27	5.20	6.49	5.43	6.27	6.0	5.56
28	5.21	6.49	5.44	6.26	6.0	5.55
29	5.22	6.48	...	...	6.1	5.54
30	5.23	6.48	...	...	6.1	5.53
31	5.23	6.47	...	...	6.2	5.52

PHASES OF THE MOON, ECLIPSES, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when summer time is not in force.

		H. M.
6 January	(First Quarter	8 24 p.m.
14 "	○ Full Moon	12 37 a.m.
20 "	) Last Quarter	4 0 p.m.
28 "	● New Moon	9 48 a.m.

Apogee on 3rd at 8.54 a.m.

" on 30th at 10.24 p.m.

Perigee on 15th at 9.48 a.m.

5 February	(First Quarter	2 52 p.m.
12 "	○ Full Moon	11 18 a.m.
19 "	) Last Quarter	4 18 a.m.
27 "	● New Moon	4 48 a.m.

Perigee on 12th at 9.0 p.m.

Apogee on 27th at 12.45 a.m.

7 March	(First Quarter	5 22 a.m.
13 "	○ Full Moon	9 14 p.m.
20 "	) Last Quarter	6 43 p.m.
28 "	● New Moon	11 3 p.m.

Perigee on 13th at 9.30 a.m.

Apogee on 26th at 5.36 a.m.

The splendid phenomenon of an annular or ring-shaped eclipse of the sun will be seen, if clouds do not intervene, in North Africa (including part of the Suez Canal) and in South America on 27th and 28th March.

The only other eclipse of the year will be the Great Australian Total Eclipse of the Sun on 21st September, of which special particulars will be given.

The apparent proximity of the moon and Delta Tauri early in the evening of 9th January will be of interest to those who possess telescopes or binoculars, also the occultation of Omicron Leonis on the 16th, about 1 o'clock in the morning. On 7th February Delta Tauri will be occulted by the moon about 4 o'clock in the morning, also another small star in the same constellation half an hour later, followed by another within three quarters of an hour after that.

The occultation of Jupiter by the moon on 16th February will unfortunately occur about sunrise at Brisbane, but may be observable at Oontoo, Birdsville, and other places in the far south-west.

The planet Jupiter will be coming into view before midnight in February and March; Venus will pass from west to east of the sun on 9th February; and Mercury from east to west on the 14th. Before the end of March Jupiter and Saturn will be prominent evening stars.

On 21st March the sun will rise almost exactly due east, and set due west, passing from south to north of the equator.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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